46th International Universities' Power Engineering Conference

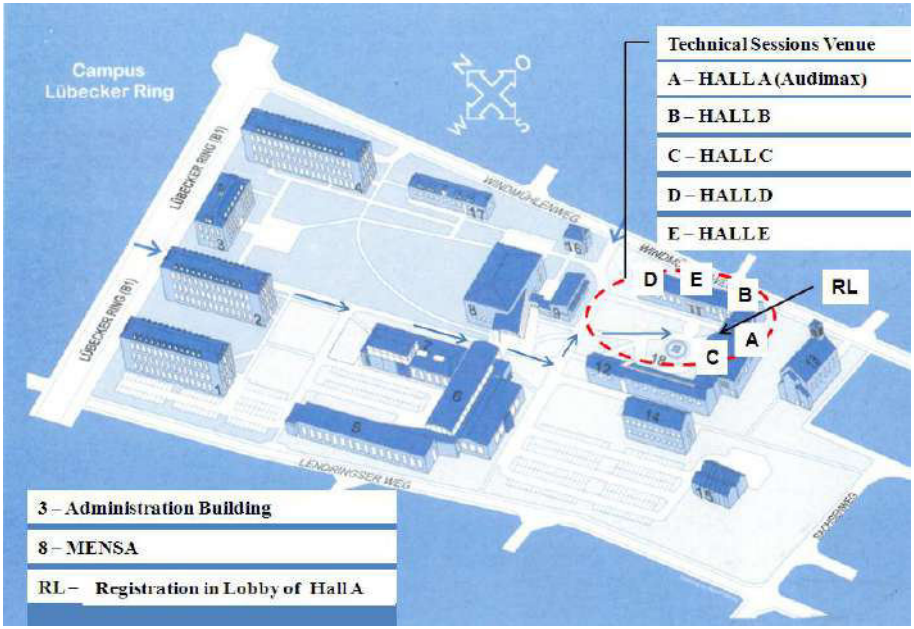
Conference Programme




UPEC	2011	5 - 8	September

South Westphalia University of Applied Sciences, Soest, Germany

UPEC 2011 Venues



Path from GuestHouse (Accomodation) to UPEC Conference

G – GuestHouse (Accomodation)
-2 km walk via Kölner Ring, WisbyRing and Lübecker Ring
U – UPEC Conference
Or by bus C4/C5 via Hansaplatz, change to C2 (University Campus, Fachhochschule)

Welcome

On behalf of UPEC 2011 Program and organizing committee, I am glad to welcome all the participants to this Conference.

UPEC is a long-established Conference, which is very popular with young researchers, PhD students and engineers from the power industry. With an effort to match the high standards set by UPEC Conferences in the past, almost 400 Abstracts were reviewed and out of them the best 220 abstracts were accepted. Special thanks to all International and Local Committee members for spending their valuable time in reviewing the abstracts and short listing the best out of them.

As Conference chairman, I would offer thanks and appreciate the efforts put in by the committee members in planning and organizing the Conference.

The historic town Soest is well known tourist destination and is popular for its ancient architecture and various historical monuments. I am sure besides the Conference; participants will enjoy their stay in the City.

Once again, I welcome you all to the UPEC 2011 Conference and wish you happy stay in Soest, Germany.

Prof. Bitzer
(Conference chairman)

46th International Universities' Power Engineering Conference

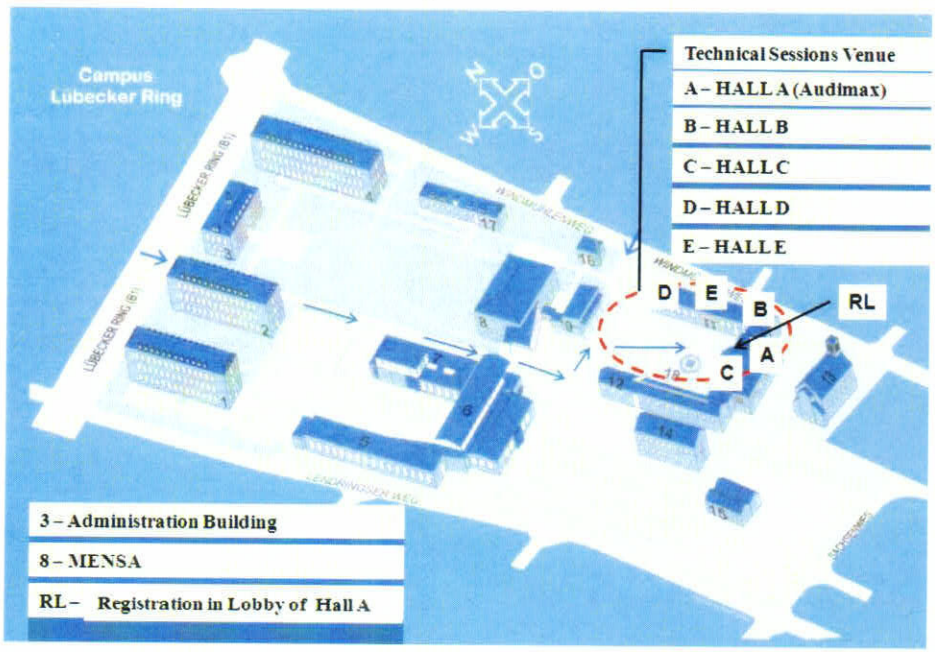
UPEC 2011

5th – 8th September 2011

ABSTRACTS

Hosted By

South Westphalia University of Applied Sciences, Soest, Germany



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Prof. Bitzer
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Monday, 5th September 2011

Time	Events	Halls
11:00 - 13:00	**Tutorial :** **Smart Grid Applications in Germany** Organized by Dr.-Ing. Peter Bretschneider, Fraunhofer-Institute Ilmenau	HALL C
14.00 – 16.00 16:00 - 18:00	**Registration** **Opening session:** Welcome Speech by the President of Parliament NRW Eckhard Uhlenberg Presentation on " DESERTEC -_Renewable Energy from the Desert " by Dr. Max Voss, RWE, Germany	Lobby HALL A
18:00 - 19:00	**Reception**	In Lobby of HALL A
19:00	Transfer to Accommodation	

Tuesday, 6th September 2011

Time	Events
09:00- 10:45	Technical Session 1 in Hall B, C, D, E
10:45- 11:15	Coffee Break (in Lobby)
11:15- 12:45	Technical Session 2 in Hall B, C, D, E
12:45- 14:00	Lunch (MENSA)
14:00- 15:30	Technical Session 3 in Hall B, C, D, E
15:30- 16:00	Coffee Break
16:00- 17:30	Technical Session 4 in Hall B, C, D, E
15.45 – 17.15	UPEC Steering Committee Meeting (Admin Building 03, Room 03.014)
17.30 18:30- 18:45	Bus transfer to accommodation Bus Transfer from Guesthouse to “Blauer Saal” (Old Town Hall)
19:00- 21:15	Civic Reception with Mayor of Soest Return to accommodation by your own: taxi or bus C4/C5 from Hansaplatz to Otto-Modersohn.

All Coffee breaks in Lobby
During all technical sessions, Registration will continue in Lobby

Wednesday, 7th September 2011

Time	Events
08:45- 10:30	Technical Session 5 in Hall B, C, D, E
10:30- 11:00	Coffee Break
11:00- 13:00	Technical Session 6 in Hall B, C, D, E
13:00 - 17.30	Bus to technical tour Warsteiner Brewery
13:00- 13.45	Lunch (MENSA) for Visitors to Nixdorf Museum, Paderborn
13:45- 17:45	Technical Tour to Nixdorf Museum, Paderborn
18:30- 19:00	Bus Transfer from Guesthouse to Conference Dinner Venue
19:30- 22:00	Conference Dinner in Hotel Hof Hueck in Bad Sassendorf

Thursday, 8th September 2011

Time	Events
09:00- 10:45	Technical Session 7 in Hall B, C, D, E
10:45- 11:15	Coffee Break
11:15- 13:15	Technical Session 8 in Hall B, C, D, E
13:15- 14:30	Farewell Lunch
14:30	Closing Ceremony (Hall A)

Tuesday, 6th September 2011
SESSION 1 (09:00- 10:45)

Session 1: 9:00-10:45 Tuesday, 6th September, Chairman: Prof. SP. Chowdhury HALL B			
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1-B-02	88	Implementation of a wind turbine system as a native c-code matlab model for parameter estimation application	Bekker, Johannes (Stellenbosch University)
1-B-03	360	Design of an intelligent solar power management system for domestic use	Bousbaine, Amar (University of Derby)
1-B-04	310	Impact of Unbalanced Penetration of Single Phase Grid Connected Photovoltaic Generators on Distribution Network	Dhavalkumar, Dhavalkumar (Alstom Grid UK)
1-B-05	43	Efficient Utilization of Photovoltaic Energy for Supplying of Remote Electric Loads	El-Sayed, Mohamed (Kuwait University)
1-B-06	136	Neural Network-Based Controller for a Solarthermic Roof Water Desalination System	Elshahawi, Mohamed (Helwan University)
1-B-07	63	Impact of Dynamic Overhead Line Rating on Power Systems	Jiao Fu (Queen's University Belfast)

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1-C-02	90	Wind farm electromagnetic dynamic model and outgoing line protection relay RTDS testing	Li, Guanghui (Xi'an Jiaotong University)
1-C-03	288	Analysis of different methods to improve the fuel cell dynamics for modern aircraft applications	Luecken, Arno (Helmut-Schmidt-University)
1-C-04	237	Generic Photovoltaic System Emulator Based on Lambert ω Function	Ghanim Putrus (Northumbria University)

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1-C-07	22	Discrete Time Simulation of an Electrical Power Network with Renewable Generation	Saharuddin Othman (Brunel University)

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1-E-03	61	Eigenvalue Analysis of Distributed Generation Including Multimass Turbine Model	Rizqiawan, Arwindra (Shibaura Institute of Tech)
1-E-04	212	Reactive power control of dfig wind turbine under super/sub synchronous operation using fuzzy logic	Saniei, Mohsen (Shahid Chamran University)
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3-D-01	343	Steady-State and Dynamic Performance of Oman Transmission System with Diesel-Engine Driven Distributed Generation	Abdalla, Omar (OETC)
3-D-02	261	DFIG Performance Assessment During Low Voltage Ride Through In The Dynamic Voltage Stability Of An Electric Power System	Carlos Ferreira (Isec)
3-D-03	204	Congestion management driven transmission expansion planning	Barbulescu, Constantin (Politehnica University TM)
3-D-04	206	Large Wind Farm Integration in Large Power Systems. Case Study: Western Romania Power System	Barbulescu,Constantin (Politehnica University TM)
3-D-05	207	Allocation of transmission cost for reactive power using system matrices method	Barbulescu, Constantin (Politehnica University TM)
3-D-06	252	Research on the Self-excitation Characteristics and Practical Criterion of Generators in Isolated Hydropower Group	Wei, Hu (Tsinghua University)

Session 3: 14:00-15:30 Tuesday, 6th September, Chairman: Prof. D. Micu HALL E			
session	**Paper ID**	**Title: Grounding and Safety**	**Authors**
3-E-01	79	An Investigation on a Transient Impedance of Vertical Electrodes	Fujita, Yuta (Doshisha University)
3-E-02	147	Determining the possibility of paralleling generators with different grounding methods	Golshani, Amir (Hannover University)
3-E-03	161	Efficiency and Probability Analysis of Lightning Protection System at Korean Nuclear Power Plants	Jang, Hong-seok (KINS)
3-E-04	312	Experimental Investigation of High Frequency and	Mousa, Salah

		Transient Performance of a Vertical Earth Electrode	(Cardiff University)
3-E-05	345	Gaza Substation Grounding	Nouri, Hassan (UWE Bristol)
3-E-06	350	Personal risks due to fault arcs in LV systems and reduction of thermal hazards by means of fuses	Schau, Holger (Technische Univertität Ilmenau)

Tuesday, 6th September 2011
SESSION 4 (16:00- 17:30)

Session 4: 16:00-17:30 Tuesday, 6th September, Chairman: Dr. M. El-Sayed			**HALL B**
Session	**Paper ID**	**Title: Smart Grid II**	**Authors**
4-B-01	123	Detection of Collusion in Pool-based Power Market Considering Demand Response	Taremi, Maryam (Semnan university)
4-B-02	103	Design and implement of timing synchronization algorithm for OFDM PLC system in low voltage power line networks	Liang, Dong (Xi'an Jiao tong University)
4-B-03	162	Implementation of algorithm for reducing the PAPR of OFDM system based on DSP	Niu, Dongwen (Xi`an Jiaotong University)
4-B-04	173	Optimal Charging Schedule of an Electric Vehicle Fleet	Hu, Junjie (Technical Uni. of Denmark)
4-B-05	247	Evaluation of Throughput and Latency Performance for Medium Voltage and Low Voltage Communications Infrastructure	Taylor, Gareth (Brunel University)
4-B-06	250	Development of novel state estimation algorithms for active distribution networks	Taylor, Gareth (Brunel University)

Session 4: 16:00-17:30 Tuesday, 6th September, Chairman: Prof. G. Burt			**HALL C**
Session	**Paper ID**	**Title: Operation and Control II**	**Authors**
4-C-01	228	Advanced voltage control strategy for on-load tap changer transformers with distributed generations	Gao, Chao (University of Bath)
4-C-02	229	A review of voltage control in smart grid and with smart metering technologies on distribution networks	Gao, Chao (University of Bath)
4-C-03	254	Scalability of Electrical Power Dispatch	Irving, Malcolm (Brunel University)
4-C-04	284	Power System Load Regulation by Pumped Storage	Jazaeri, Mostafa

		Plant; review, analysis and comparison of two projects	(Semnan University)
4-C-05	286	Optimal Siting and Sizing a Static Var Compensator in a power system with unbalanced load by Particle Swarm Optimization	Jazaeri, Mostafa (Semnan University)
4-C-06	287	An Optimum controller for Doubly Fed Induction Generator to Improve Power System Operation	Jazaeri, Mostafa (Semnan University)

Session 4: 16:00-17:30 Tuesday, 6th September, Chairman: Dr. G. Putrus HALL D			
Session	**Paper ID**	**Title: Simulation and Analysis II**	**Authors**
4-D-01	68	Capacity assessment of residential demand response mechanisms	Pagliuca, Simone (Eindhoven University of Technology)
4-D-02	83	Improved Time-Domain Modeling of Underground Cables	Papagiannis, Grigoris (Aristotle University of Thessa)
4-D-03	121	Simulation of Switching and Lightning Transients in Parallel Single-Core Underground Cables	Papagiannis, Grigoris (Aristotle University of Thessa)
4-D-04	112	Modelling and Simulation of a MEA Twin Generator UAV Electrical Power System	Rakhra, Puran (University of Strathclyde)
4-D-05	242	Network Based Generation And Transmission Expansion Planning	Saniei, Mohsen (Shahid Chamran University)
4-D-06	4	Design and analysis of heat regeneration technique in a combined cycle power plant	Sanjaya, Hadi (Swiss German University)

Session 4: 16:00-17:30 Tuesday, 6th September, Chairman: Prof. C. Stassinopoulos HALL E			
Session	**Paper ID**	**Title: Power Conversion and HVDC**	**Authors**
4-E-01	54	Controller Design for Wind Energy Conversion System Based on Particle Swarm Optimization	Sobhani, Behrooz (Azad University)
4-E-02	203	Power converters for power-ultrasonic transducers	Wang, Ying (The University of Bath)
4-E-03	271	Mitigation of Fatigue Loads Using Individual Pitch Control of Wind Turbines Based on FAST	Zhang, Yunqian (Energy Technology, AAU)
4-E-04	341	Calculation of Short Circuit Currents in HVDC Systems	Wasserrab, Andreas (TU Darmstadt)

4-E-05	190	Principle Research on Suppressing Harmonic Instability of HVDC Transmission Using an Inductive Filtering Method	Luo, Longfu (Hunan University)
4-E-06	215	HVDC Circuits to constrain Voltage Collapse propagating through the Power Transmission Networks	Wang, Hualei (University of Bath)

Wednesday, 7th September 2011
SESSION 5 (08:45- 10:30)

Session 5: 08:45-10:30 Wednesday, 7th September, Chairman: Dr. G. Taylor HALL B			
Session	**Paper ID**	**Title: Renewables III**	**Authors**
5-B-01	295	Improvement the Integration of Zafarana Wind Farm Connected to the Egyptian Unified Power Grid	Mahfouz, Mohamed (Helwan University)
5-B-02	53	Water desalination with evaporation from environmental friendly waste heat source	Buschert, Daniel (Soest University)
5-B-03	225	Energy Saving Technology on Irrigation System for Rice Cropping	Pfitscher, Luciano(UNIPAMPA)
5-B-04	100	Real current carrying capacity of overhead lines that connect wind parks to the power system	Poučković, Bojan(ELEM&ELGO)
5-B-05	111	Simulation of DSM Actions Impact Prediction on Residential Daily Load Shape	Prudenzi, Alberto(University of L'Aquila)
5-B-06	236	Exploiting Solar Power for Electricity Generation in Cyprus	Redfern, Miles (University of Bath)
5-B-07	268	Towards an Economy based on Renewable Energy Generation: Is Biogas part of the Solution?	Stauss, Wolfgang (FH Südwestfalen [i.green])

Session 5: 08:45-10:30 Wednesday, 7th September, Chairman: Prof. D. Micu HALL C			
Session	**Paper ID**	**Title: Quality and Protection I**	**Authors**
5-C-01	153	A proposed control strategy for UPQC based on Adaptive Notch Filter (ANF)	Ghazi, Reza (Ferdowsi University of Mashhad)
5-C-02	6	Investigation of Substation Installed Shunt Active Power Filter in AC electrified Railway Systems	Hosny, Wada (UEL)
5-C-03	7	Investigation of Sectioining Post Installed shunt Active Power Filter in AC Electrified Railway Systems	Hosny, Wada (UEL)
5-C-04	81	Voltage envelope Tracking Techniques using dq transformation	Khodaparast, Jalal (Shahrood University ,Iran)
5-C-05	92	Coordinated Control of DFIG`s Rotor and Grid Side Converters Using Stator-Voltage Oriented Frame During Network Unbalance	Nikzad, Vahid (Shahrood University ,Iran)
5-C-06	340	Evaluating the Impact of Superconducting Fault Current Limiters on Distribution Network Protection Schemes	Kincaid, Jennifer (University of Strathclyde)
5-C-07	164	Power Quality Monitoring by Virtual Instrumentation using Lab VIEW	Laskar, Shahedul (NIT, Silchar(India))

Session 5 08:45-10:30 Wednesday, 7th September, Chairman: Dr. R. Speh HALL D			
Session	**Paper ID**	**Title: Operation and Control III**	**Authors**
5-D-01	20	Economic Load Dispatch with Daily Load Patterns Using Particle Swarm Optimization	Rugthaicharoencheep , Nattachote (Rajamangala University)
5-D-02	128	Optimal Locating and Sizing of TCPST for Congestion Management in Deregulated Electricity Markets	Sepahvand, Hamed (Shahid Chamran University)
5-D-03	231	Network Voltage Management using Distributed Generation	Shang, Wenting (University of Bath)
5-D-04	221	Damping Inter-area Oscillations using Static Synchronous Series Compensator (SSSC)	Su, Chi(Aalborg University)
5-D-05	75	Trends in Probabilistic Power System Reliability Analysis - A Survey	Tuinema, Bart (TU Delft)

5-D-06	77	State estimation model including synchronized phasor measurements	Vide, Paula (ESTG-IPLeiria)
5-D-07	56	High Efiiciency Predictive Control Strategy applied to a Power Factor Correction System	M.C. Miglionico and Parillo, Fernando (University of Cassino)

Session 5: 08:45-10:30 Wednesday, 7th September, Chairman: Dr. H. Nouri HALL E			
Session	**Paper ID**	**Title: Electricity Market and Future**	**Authors**
5-E-01	208	Small Signal Stability Improvement of Power Systems Using Optimal Load Responses in Competitive Electricity Markets	Hu, Weihao (Aalborg University)
5-E-02	246	Bilateral Electricity Market Modeling Using Combined Hierarchical Optimization Method and Conjectural Variation Equilibrium Model	Irving, Malcolm (Brunel University)
5-E-03	149	Predicting load model with considering geographical information system to improve processes of electricity market in distribution network	Mohseni, Mostafa (Shahid Beheshti University)
5-E-04	71	An Efficient Method for Considering Electrical Bilateral Contracts in the Unit Commitment Algorithm of Electricity Market	Nikzad, Vahid (Shahrood University of Tech)
5-E-05	94	A new Framework for Improved Discrete Particle Swarm Optimization in the use of Transmission Network Expansion Planning	Tajik, Saeed (Shahid Beheshti University)
5-E-06	96	A New Method for Transmission Network Expansion Planning: Improved Discrete Harmony Search Algorithm	Tajik, Saeed (Shahid Beheshti university)
5-E-07	200	Power Market Test and Analysis with Generation Emission Allowance Constraints and Trades using Agent-Based Modelling	Zhao, Yu (University of Strathclyde)

Wednesday, 7th September 2011
SESSION 6 (11:00- 13:00)

Session 6: 11:00-13:00 Wednesday, 7th September, Chairman: Prof. N. Shammas HALL B			
Session	**Paper ID**	**Title: Power Electronics and Machines**	**Authors**
6-B-01	258	Direct Instantaneous Torque Control of Switched Reluctance Motors Using Five Level Convertor	Saniei, Mohsen (Leibniz Universitat Hannover)
6-B-02	320	Modelling of Super capacitor Modules and Parameters Extraction	Gazwi, Abdeladim/Shammas (Ras Lanuf Oil & Gas Company)
6-B-03	30	A Swappable Single Phase Switched Reluctance Motor with Bifilar Drive Convertor	Asgar, Majid (Shahid Beheshti University)
6-B-04	326	Enhanced Direct Torque Control for Doubly Fed Induction Machine by Active Learning Method	Ejlali, Abdolhossein (IUST)
6-B-05	70	A New Hysteresis-SVPWM Method for Torque Ripple Reduction of PMSM Based on Direct Torque Control	Nikzad, Vahid (Shahrood university)
6-B-06	108	A Modified Space Vector Pulse Width Modulation Method for Even Harmonic Elimination	Nikzad, Vahid (Shahrood university)
6-B-07	35	A Suggestive Method for Proper Prediction of Dynamics using Bifurcation Diagram in Cuk Converter	Parui, Sukanya (BESUS)
6-B-08	255	A Multi-Frequency PWM Scheme for Multi-Level Five-Phase Open-End Winding Drives	Satiawan, Inyoman (Liverpool John Moores University)

Session 6: 11:00-13:00 Wednesday, 7th September, Chairman: Dr. C. Ozveren HALL C			
Session	**Paper ID**	**Title: Distributed Energy II**	**Authors**
6-C-01	317	Optimal Sizing of Combined Heat Power (CHP) Generation in Urban Distribution Network (UDN)	Boljevic, Sreto (Cork Institute of Technology)
6-C-02	23	Technical and Economic Assessment of Power Generation from Dairy Farm-Based Biogas Plants in South Africa	Chowdhury, Sunetra (UCT)
6-C-03	24	Technical and Economic Feasibility Study of Landfill Gas-based CHP Plants in South Africa	Chowdhury, Sunetra (UCT)
6-C-04	224	An Overview of Four Types of Energy Storage	Chukwuka, Chukwubuikem (UCT)
6-C-05	60	Automatic Mapping of Virtual Distribution Networks Model using Fractal Theory	Hida, Yusuke (Waseda University)
6-C-06	198	Application of Grid Integrated Wind Energy Conversion Systems for Mitigation of Multiple Voltage Dips in a Power Network	Ipinnimo, Oluwafemi (UCT)
6-C-07	278	Load shifting by heat pumps using thermal storage	Leeuwen, Willem (Universiteit Eindhoven)

Session 6: 11:00-13:00 Wednesday, 7th September, Chairman: Dr. R. Biernatzki HALL D			
Session	**Paper ID**	**Title: Quality and Protection II**	**Authors**
6-D-01	349	Analysis of a Ratio between ΔV10 and Pst Flicker Criteria	Novitzkij, Alexander (Technische Universität Ilmenau)
6-D-02	260	Investigation of a critical voltage proximity index at distribution level	Polycarpou, Alexis (Frederick University)
6-D-03	266	Power quality indicators based upon symmetrical components for two-phased faults	Porumb, Radu (University Politehnica of Buch)
6-D-04	69	Under-Reaching Factor for Distance Relay with Mho Characteristic for Inter Phase faults	Shateri, Hossein (Iran Univ. of Science & Tech.)
6-D-05	101	Impact of TCSC on Measured Impedance by Distance Relay for Inter Phase Faults in Double-	Shateri, Hossein (Iran Univ. of Science &

		Circuit Lines Considering MOV Operation	Tech.)
6-D-06	135	Measured Impedance at Relaying Point for Inter Phase Faults on Line behind	Shateri, Hossein (Iran Univ. of Science & Tech.)
6-D-07	46	Bad Data Identification in Voltage Sag State Estimation for Wind Farm Connections	Wang, Bin (Tsinghua University, China)
6-D-08	65	Service Restoration Based on Dynamic Programming	Zhang, Hao (Beijing Jiaotong University)

Session 6: 11:00-13:00 Wednesday, 7th September, Chairman: Prof. P. Thiemann HALL E			
Session	**Paper ID**	**Title: Electrical Machines and Power Electronics**	**Authors**
6-E-01	168	Adaptive LMS Algorithm Based Input Current Harmonic Suppression in AC-DC-AC Systems with Either Constant or Pulsed DC Link	Jeevananthan (Pondicherry)
6-E-02	169	Selective Current Harmonic Elimination in a AC Voltage Controller Drive System using LMS Algorithm	Mahalingam, Sudhakaran (Pondicherry)
6-E-03	322	DTFC Based Indirect Matrix Converter Using Active Flux Concept for IPMSM Drive	Ejlali, Abdolhossein (IUST)
6-E-04	339	Investigation of series compensation on dynamic performance of short rotor linear induction motors	Hamzehbahmani, Hamed (Azad Univercity of Ghorveh)
6-E-05	183	Direct Flux Control (DFC): A New Sensorless Control Method for PMSM	Mantala, Chawanakorn (Soest University)
6-E-06	243	Performance Comparison of Speed Estimation Methods in Sensorless Direct Torque Control of PMSM	Nabizadeh, Nima (Shahrood university)
6-E-07	82	Detection of Several Flicker Sources in a Nonradial Power System	Khodaparast, Jalal (Shahrood University ,Iran)
6-E-08	329	Design and numerical magnetic fields analysis of 10 kVA, 220/24 V, HTS transformer	Davood Khosravi (National iranian oil company)

Thursday, 8th September 2011
SESSION 7 (09:00- 10:45)

Session 7: 09:00-10:45 Thursday, 8th September, Chairman: Dr. H. Schau HALL B			
Session	**Paper ID**	**Title: Renewables IV**	**Authors**
7-B-01	175	The Use of Electrical Thermal Storage to Balance the Variability and Intermittency of Renewable Energy	Storry, Rachael (University of Strathclyde)
7-B-02	167	The Statistical Modelling of Residential Electrical Demand for the Evaluation of Impacts that Result from Demand Side Management Interventions	Urban, Graeme (Stellenbosch University)
7-B-03	205	An investigation of the power consumption and quality of supply for lighting technologies used in industrial energy-efficient initiatives	Vermeulen, Hendrik (Stellenbosch University)
7-B-04	344	Field Oriented Control of a Permanent Magnet Synchronous Generator for use in a variable speed Tidal Stream Turbine.	Whitby, Ben (Cardiff University I)
7-B-05	154	Chinese Offshore Wind Generation and Its Contribution towards Chinese Renewable Target	Yu, James (Northumbria University)
7-B-06	109	Photovoltaic Generation and Voltage Dips: a study to investigate the behaviour of the system connected to the distribution network with power electronic devices	Belloni, Federico (RSE spa)
7-B-07	337	Design and analysis of a sliding-mode power electronic controlled battery / supercapacitor hybrid energy storage system for remote wind power applications.	Gee, Anthony (University of Bath)

Session 7: 09:00-10:45 Thursday, 8th September, Chairman: Prof. P. Thiemann HALL C			
Session	**Paper ID**	**Title: Power System Condition Monitoring**	**Authors**

7-C-01	319	Locating Partial Discharge Using Particle Swarm Optimisation	Harris, Rachel (University of Strathclyde)
7-C-02	91	A Methodology for Risk Based Asset Replacement and Investment Planning	Johnson, Anna (Strathclyde University)
7-C-03	251	Statistical analysis of partial discharge data based on master equations	Taylor, Gareth (Brunel University)
7-C-04	8	The Optimization of Reactive Power with Released Constraint in Power System	Xiaowei, Wang (Hebei Electric Power Reasearch)
7-C-05	9	Research for Network Reconfiguration Based on Improved Binary Particle	Xiaowei, Wang (Hebei Electric Power Reasearch)
7-C-06	58	Load measurement and analysis for inverse load reconstruction	Yang, Bin (University Stuttgart)
7-C-07	59	Joint modeling of device load and user intention	Yang, Bin (University Stuttgart)

Session 7: 09:00-10:45 Thursday, 8th September, Chairman: Prof. SP.Chowdhury HALL D			
Session	**Paper ID**	**Title: Simulation and Analysis II**	**Authors**
7-D-01	28	Integration of Stochastic Power Generation, Geographical Averaging and Load Response	Lamadrid, Alberto (Cornell University)
7-D-02	316	Feasibility Studies on Technical, Economic and Environmental Impact of Combined Heat and Power (CHP) Generation on	McHugh, Benny (Cork Institute of Technology)
7-D-03	177	Application of Dynamic Line Rating to Defer Transmission Network Reinforcement due to Wind Generation	McLaughlin, Ailish (Northern Ireland Electricity)
7-D-04	180	An integrated approach for the design of Aircraft Electrical Networks	Montgomery, Ross (University of Strathclyde)
7-D-05	194	Switching transients in long AC cable connections to offshore wind farms	Moore, Fabian (Cardiff University)
7-D-06	158	Transient Stability Analysis on the Offsite Power System of Korean Nuclear Power Plants in 2012	Oh, SungKyun (KINS)
7-D-07	99	Investigation of wind farm Interaction with the National Grid in Ethiopia	Beyene, Getachew Bekele (Addis Ababa University)

Session 7: 09:00-10:45 Thursday, 8th September, Chairman: Dr. G. Putrus HALL E			
Session	**Paper ID**	**Title: Operation and Control IV**	**Authors**
7-E-01	232	Investigation of transformer's reactive power consumption for different operational voltages	Abbott, Stephen (The Queen's University Belfast)
7-E-02	126	Performance of Wide-Area based Fuzzy Logic Power System Stabilizer	Alsafih, Hamza (University of Bath)
7-E-03	29	Implementation of free governor action in power plant to increase system resilience of jawa bali power system	Barus, Dhany (PLN P3B Jawa Bali)
7-E-04	202	Applications of pmus in power distribution networks with distributed generation	Ding, Feng (University of Strathclyde)
7-E-05	34	Identification of the horizontal network interconnecting the portuguese and spanish electrical power systems	Domingues dos Santos, Patrícia (DEE, IPC/ISEC, Portugal)
7-E-06	110	A New Approach for Solving EDP with Consideration of Wind Units Generation Uncertainty by Applying Monte Carlo Method	Eghbalpour, Hamid (Shahid Beheshti University)
7-E-07	174	Protection of Future Marine Electrical Systems	Ritchie, Douglas (University of Strathclyde)

Thursday, 8th September 2011
SESSION 8 (11:15- 13:15)

Session 8: 11:15-13:15 Thursday, 8th September, Chairman: Prof. N. Shammas HALL B			
Session	**Paper ID**	**Title: Electrical Effects**	**Authors**

8-B-01	130	High Field Effect on the Conduction Phenomena in Polymeric Materials	Saidi, Mohamed (University (USTHB))
8-B-02	132	Effect of Trapping on Electrical Conduction on Polar Polymers: Numerical Calculation	Saidi-Amroun, Nadia (University (USTHB))
8-B-03	189	Performance investigation of composite and RTV SIR coated insulators at a coastal test station	Siderakis, Kiriakos (T.E.I. of Crete)
8-B-04	234	Numerical analysis of a new experimental set-up for measurements of shielding effectiveness	Miron, Olivia (Technical University of Cluj)
8-B-05	306	Advances on the Electromagnetic Field Distribution Analysis inside High Voltage Substations	Munteanu, Calin (Technical University of Cluj-N)
8-B-06	143	Influences of Very Fast Transient Electromagnetic Fields on Control Cables in a Gas-Insulated Substation Due to Switching Operations	Shahabi, Saeed (IUST)
8-B-07	253	Developing emerging standards for power system data exchange to enable interoperable and scalable operational modelling and analysis	Taylor, Gareth (Brunel University)
8-B-08	279	A Study of Distributed Generation System Characteristics and Protective Load Control Strategy	Wei, Mu (Aalborg University)

Session 8: 11:15-13:15 Thursday, 8th September, Chairman: Prof. G. Papagiannis HALL C			
Session	**Paper ID**	**Title: Operation and Control V**	**Authors**
8-C-01	233	Impact of induction machine based wind generation on power system voltage and oscillatory stability	Xia, Jun (University of Strathclyde)
8-C-02	104	A Control Method for Power System Stabilizers by means of a Support Vector Machine	Zoka, Yoshifumi (Hiroshima University)
8-C-03	223	Development and Testing of a Branch Current Based Distribution System State Estimator	Mutanen, Antti (Tampere University)
8-C-04	145	The Need for an Agent Arbitration Approach for Coordinated Control in Active Power Networks	Owonipa, Ayodeji (University of Strathclyde)
8-C-05	55	A current hysteresis controller for the reduction of switching power losses in a full-bridge inverter – fpga implementation using a custom developed sfloat24 math library –	M.C. Miglionico and Parillo, Fernando (University of Cassino)
8-C-06	191	Wind Turbine, Micro Turbine and Solid Oxide Fuel Cell (SOFC) based Hybrid Power System Model and Telelab	Kolhe, Pankaj (Soest University)

8-C-07	116	Optimum Position of a Grounding Wire within a Building for Reduction of Lightning Surge Voltages	Okumura, Kazuhiro (Doshisha University)
8-C-08	196	Development of an online energy auditing software tool with remote sql-database support	Johannes Van der Merwe (Stellenbosch University)

Session 8: 11:15-13:15 Thursday, 8th September, Chairman: Prof. P. Mikropoulos HALL D			
Session	**Paper ID**	**Title: High Voltage II and Electrical effects**	**Authors**
8-D-01	352	Right of way - buried metallic pipelines hv-power lines. Mitigation techniques	Ancas, Liviu (ClujUniversity)
8-D-02	293	Lightning interaction with 132 kv transmission line protected by line surge arresters	Caulker, David (Universiti Teknologi Malaysia)
8-D-03	217	A user - friendly software application for induced ac interference evaluation	Czumbil, Levente (Technical University of Cluj)
8-D-04	52	Optimization and Protective Distance of Surge Protective Devices in Low-Voltage AC Power Circuits	Skuletic, Sreten (University of Montenegro)
8-D-05	42	The Influences of Decoupling Elements on the Testing of Low Voltage Spark Gap and Varistor	Waluyo, Waluyo (Itenas)
8-D-06	263	Consideration of Electricity and Heat Load Profiles for Intelligent Energy Management Systems	Laura Ramirez Elizondo (Delft University of Technology)
8-D-07	86	Performance Investigation of a Unified Power Quality Conditioner with new configuration	Ghazi, Reza (Ferdowsi University of Mashhad)
8-D-08	66	Voltage Sag Analysis of Emergency Generator on starting of IM Loads -Application of SMES	Uriu, Yoshihisa (Seikei University)

Session 8: 11:15-13:15 Thursday, 8th September, Chairman: Dr. R. Biernatzki HALL E			
Session	**Paper ID**	**Title: Simulation and Analysis III**	**Authors**
8-E-01	44	Grid Frequency Response of Different Sized Wind Turbines	De Haan, Jerom (TU/e)
8-E-02	89	Influence of Fixed-Speed Induction Generator-Based Wind Turbines on Subsynchronous Resonance	Ewais, Ahmed (Cardiff University)
8-E-03	280	Integrated and centralized management of electrical services in power distribution utilities	Garcia, Vinicius (Federal University of Pampa)
8-E-04	331	The Digital Transient Model for Frequency-dependent Parameter Transmission Lines	HA, Hengxu (Shandong university)
8-E-05	210	Impact of Different Load Models on Reliability Evaluation in Power Sytems	Ip Cho, Nicolas (UCT)
8-E-06	117	High Frequency Resonance of a Structure for PV panel	Kubo, Yuta (Doshisha University)
8-E-07	72	Implication of non-conventional rural electrification technologies on electricity distribution system planning in Kenya (Review).	Saulo, Michael (Mombasa Polytechnic University)
8-E-08	384	Observations of the wind resource across the dublin urban area	Sunderland, Keith (DIT)

Notes

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Tutorial
Tutorial from Dr.-Ing. Peter Bretschneider, Fraunhofer-Institute Ilmenau on "Smart Grid Applications in Germany". It will be conducted in HALL C, University Campus, Soest.

Opening Ceremony and Desertec
Eckhard Uhlenberg, President Parliament NRW will formally open the conference followed from the presentation on "DESERTEC - Renewable Energy from the Desert" by Dr. Max Voss, RWE, Germany. It will be conducted in HALL A, University Campus, Soest.

Technical Session
There are 32 technical sessions conducted in Hall B, Hall C, Hall D and Hall E. 16 sessions are conducted on Tuesday, 6th September; 8 sessions on Wednesday, 7th September and 8 sessions on Thursday, 8th September. There will be directions to find the rooms and UPEC local organizing members will be available for any kind of assistance whenever required.

Social Events
Civic reception with Mayor of Soest is organized on Tuesday, 6th September.
Conference Dinner is organized in Hof Hueck in Bad Sassendorf on Wednesday, 7th September.

University Accommodation
UPEC delegates have been allocated accommodation in Guesthouse NRW on Paradieser Weg 64, Soest. Maps show the roads to Accommodation from Railway Station and from Accomodation to Conference Venue.
Accommodation for some Students is organized in Frauenhilfe Hostel on Feldmühlenweg 19, Soest.

Cultural Visit
The Cultural Visit for UPEC 2011 will be Technical tour to Heinz Nixdorf Computer Museum in Paderborn on Wednesday afternoon.

Another group can visit Warsteiner Brewery in Warstein during the same time. Buses are organized for both the venues as per the choices provided by the participants during registration.

Lunch and Coffee Breaks
Lunch will be provided in MENSA as per the timings specified in the schedule. Lunch tickets will be provided to all the delegates.
Coffee breaks are organized in Lobby of Hall A.

Information for Presenters
For presentations, a PC, a data projector and a whiteboard will be available in each room. The author is asked to prepare the presentation in PowerPoint and to bring this file on an USB-stick to the conference. Each presenting author is asked to meet with the Session Chair 15 minutes (at least) before the session starts. It is due to check the presence and to upload the file with the presentation onto the PC.
Each author will have about 15 minutes to present the paper and to answer all questions. The time is subdivided in 12 minutes for the presentation and 3 minutes for the discussions with the auditorium. After about 10 minutes during the presentation, the Session Chair will remind the author that he or she has to conclude. However, if time permits, the Session Chair can allow more time for the presentation. Presenting authors may bring a number of photocopies of their full paper to the session, for any delegate who wishes to receive a copy of the paper.
The language of the presentation and discussion is English.

Conference Secretariat and Registration desk
Registration will continue during all the technical sessions in Lobby of Hall A.
Conference Secretariat will be available during the conference period from 8:30 am.

Prizes
Best Conference Paper Award
Best Oral Presentation Award

Useful Numbers
UPEC Secretariat (Ms. Grey): +49 2921 378419
Emergency Numbers:
017635384323 (Pankaj Kolhe)
017662827652 (Mussie Geberlassie)
01729995040 (Prof. Berthold Bitzer)

46th International Universities' Power Engineering Conference

UPEC 2011

It is with great pleasure that the South Westphalia University of Applied Sciences invites you to the 46th International Universities' Power Engineering Conference (UPEC2011) in Soest, Germany.

The Historic Town Soest

The Conference Venue

Conference Accomodation

5th - 8th September 2011

UPEC is a long-established conference, which is very popular with young researchers, PhD students and engineers from the power industry. It allows participants to exchange experiences and discuss the most up-to-date topics in power engineering.

The subject areas covered include but are not restricted to: (Call for papers)

Upload Paper

UPEC is an ideal forum for a wide range of important engineering topics. The subject areas covered by the conference include but are not restricted to:

- Innovation and Future Power System
- Smart Grids, Electricity Market
- Renewable Energy System, Energy Saving
- Power System Operation and Control
- Power Engineering Education
- Power System Simulation and Analysis
- Distributed Generation, Energy Management
- HVDC
- Power Quality and Protection
- High Voltage Engineering and Dielectrics
- Grounding and Safety
- Electromagnetic and Electrostatic Effects
- Electrical Machines and Drives
- Power Electronics and Devices
- Power Conversion
- Electric Transportation and Mobility
- Power System Condition Monitoring
- Diagnostics and Measurements in Power Systems
- Electrical Systems for Buildings

The one-page abstract should contain the title of the paper, contact person, authors and their affiliations, keywords, together with a summary of the paper and its main contributions. The main conference subject area to which the paper is most relevant should also be quoted.

Abstract submission instructions

After acceptance of an abstract, authors will be requested to submit the full paper with a maximum of six pages.
It should be noted that only electronically submitted papers and abstracts will be considered. All accepted papers have to be presented at the conference, and will be published in the conference proceedings. English will be used for all printed material, as well as for the technical presentations and discussions. It is planed that presented papers will be listed in IEEE Xplore and INSPEC, and indexed by EI Compendex.

Dates and deadlines:

IMPORTANT

There is Delay in Review Process. However, the process of sending Acceptance letters has already started. The authors are asked to have patience. All the results will be conveyed shortly .

New Deadline for Paper Submission: 29.05.2011

Deadline for receipt of abstracts	**25th February 2011**
Steering committee meeting	**11th March 2011**
Notification of abstract acceptance	**Review delayed, acceptance starting from 6th April 2011**
Deadline for receipt of full paper	**29th May 2011**
Deadline for early registration	**1st July 2011**
UPEC2011 conference	**5th- 8th September 2011**

To download a PDF version of the original Call for Papers leaflet (upec2011_call_for_papers.pdf).

Important Dates

IMPORTANT

There is Delay in Review Process. However, the process of sending Acceptance letters has already started. The authors are asked to have patience. All the results will be conveyed shortly .

Note:

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Deadline for early registration	1st July 2011

Abstract submission

Paper Submission is on Hold for coming days till the UPEC

COPYWRITE conditions

are UPDATED!!... Please do not upload your Papers!!!!

Instruction for authors:

1. Abstract preparation guidelines

The one-page abstract should contain the title of the paper, contact person, authors and their affiliations, keywords, together with a summary of the paper and its main contributions.
The primary conference subject area to which the paper is most relevant should be quoted.
It should be noted that only electronically submitted abstracts in Word or '.pdf' format will be considered.

2. Abstract uploading instructions

1. First, you need to create a user account by clicking the 'Sign up' button in the login window. You can also use the same box to login subsequently to check your account, papers etc.

Submit an abstract or paper to UPEC2011 / Login to your account

2. Enter the paper title, all authors' e-mail addresses and your subject area preferences.

3. Upload your paper abstract/s using the 'File upload' facility. (It is prefered that you upload your abstract using the file upload facility, located at the bottom of the page; however, you may type in the abstract directly if necessary)

Note: that confirmation of successful abstract upload will appear on the 'Author Console' page; e-mail confirmation will not be sent. Authors are able to check and edit submitted files up until the abstract submission deadline.

Paper Submission

This page is still under Construction.....Paper Submission is on Hold for coming days till the UPEC COPYWRITE conditions are UPDATED!!...Please do not Upload your papers!!!

Instruction for authors:

1. Paper preparation guidelines

The paper template and instructions on paper preparation are given below.

Please note that the full paper cannot exceed six pages in length.

UPEC paper template and instructions as PDF or DOC.

2. Paper Uploading Instructions

1. Accept Copy right conditions by following the link

Registration

Registration

Authors must register and present their papers at the conference. Failure to pay registration fee will exclude the paper from the conference proceedings.

Registration instructions

Registration form (will be added soon)

Method of Payment : (will be added soon)

Registration/Conference Fee and Accomodation

Registration for the conference includes all coffee breaks, lunches, two evening receptions, conference dinner, cultural visit and delegate pack.

For residential bookings, rooms have been reserved for delegates at Guesthouse of State North Rhine Westphalia for 3 nights: 5th september, 6th september, 7th september. An extra night can be booked by writing to the secretary: info@upec2011.org at additional cost of 40 €.

Alternatively, you may want to arrange your own accommodation in one of the many hotels in Soest or near by Bad Sassendorf (Taxi costs appro. 9 € from soest to Bad Sassendorf). Details are available (here)

RESIDENTIAL BOOKINGS

	EARLY REGISTRATION	LATE REGISTRATION [2]
REGISTRATION FEE	if payment is received	if payment is received
FOR	before 1st July 2011	after 1st July 2011
IET, IEEE, VDE MEMBERS*	600€	670€
NON-MEMBERS IET OR IEEE	640€	710€
STUDENT [1]	430€	490€

NON-RESIDENTIAL BOOKINGS

	EARLY REGISTRATION	LATE REGISTRATION [2]
REGISTRATION FEE	if payment is received	if payment is received
FOR	before 1st July 2011	after 1st July 2011
IET, IEEE MEMBERS*	480€	550€
NON-MEMBERS IET OR IEEE	520€	590€
STUDENT [1]	310€	380€

[1] Student registration must be accompanied by letter from the Department/Institute Head confirming full-time student status

[2] Accommodation will not be guaranteed beyond 1st July

*Member Registration Number should be confirmed.

Reviewers' area

Instructions for reviewers

As a Reviewer, you will be contacted by e-mail inviting you to act as a reviewer.

1. Accepting to be a Reviewer

First, you need to accept the invitation by opening the invitation e-mail and following the instructions for accepting the invitation.

2. Creating an account / login to account

If you have already created an account e.g. by submitting an abstract, you can use the same account to access your reviewer area. If you have not created a user account, please follow the instructions through the link below.

Reviewers' sign-up / login to UPEC2011

Once you open the webpage, click the 'Sign up' button in the login window. You can also use the same box to login subsequently to check your account, papers etc.

3. Performing review of papers

Please follow the instructions in the Reviewer Console:
1. Select "Paper Reviews and Discussions" to access the list of papers assigned to you.
2. Download each abstract/paper.
3. Send your review using the on-line option.

Conference Program

The Conference registration and reception will take place on the evening of Monday 5th September, with late registration available on the morning of Tuesday 6th September.

There will be a Civic reception on the evening of the 6th September, and the conference dinner will be held on the evening of the 7th September. There will also be an excursion on the afternoon of the 7th September.

The technical program comprises:

•Presentation of accepted papers

•Invited presentations on selected topics

•A tutorial on Monday 5th September

A social program will also be offered to delegates and their companions to provide maximum opportunity for networking.

Full UPEC2011 Technical Program will be published in due course.

UPEC Steering Committee

Prof. A. Ametani (Japan)
Dr.Nigel Bish (UK)
Prof. B. Bitzer (Germany)
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Prof. S. P. Chowdhury (India)
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Prof. N. Shammas (UK)
Prof. C. A. Stassinopoulos (Greece)
Dr. G. Taylor (UK)
Prof. R. Turri (Italy)

Steering committee date: 11 Mar 2011, at 10 am- 3 pm
Accomodation: Maritim Hotel Schnitterhof **Bad** Sassendorf
(10 March 2011) Salzstraße 5
Venue: 59505 Bad Sassendorf
(11 March 2011) (5 km from Soest)
How to get to Maritim Hotel
South Westphalia University
(Fachhochschule südwestfalen)
Building 03 014
Lübecker Ring 2
59494 Soest
How to get to **Soest** (Link)

Advisory and Organizing Committee

International Advisory Committee

Prof. A. Amin (Helwan University)
Prof. B. Bitzer (South Westphalia University)
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Prof. G. Virk (University of Wellington)
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Local Organizing Committee

Dr. R. Biernatzki
D. Buschert
B. Grey
P. Kolhe
Prof.G.Virk

Conference Secretariat

Prof. Berthold Bitzer
UPEC 2011 Secretariat
Luebecker Ring 2
59494 Soest, Germany
Phone: +49-2921-378-412
Fax: +49-2921-378-404
E-mail: info@upec2011.org

Transportation

How to get there

It does not matter traveling by train, plane or car carried, the Campus Soest has a very good transport links.

By bus

From **Bahnhof Soest** (train-bus station) take a bus number R49 or C2 till **Fachhochschule Soest** (Campus) bus stop. The buses run every half hour or 15 minutes, the trip takes about 11 minutes and costs 1.5 €.

or

The taxi ride from the train station Soest costs to the **Fachhochschule Soest** (Campus) about 9 €.

By car

Please check in online map to Luebeker Ring 2, 59494 Soest.

By air and train

The airport Paderborn / Lippstadt and Dortmund are located about 40 km from Soest, the International Airport Duesseldorf and Cologne-Bonn is located about 120 km (2 hours) from Soest. Nice day ticket for train in North Rhine-Westphalia (NRW) incl. bus is 25 €/person or 34 €/5 persons (not valid for fast train ICE and IC).

Other airport like Frankfurt International Airport (about 300 km from Soest) is also available. Pleas, check in BAHN.DE for the connection schedule and best price to Soest.

Venue Map

UPEC2011 Venue Map

PDF Printable Maps: Campus Soest Map – UPEC 2011 Plan.pdf UPEC2011

Campus Soest

UPEC 2011 Plan

Venues

more photos ...

Location on Map

The Main Building, conference sessions venue, is represented by a green color on the map.

Accommodation

University Accommodation

En-suite accommodation with breakfast will be in the Guesthouse of State North Rhine Westphalia residences (if booked before 5th July 2011).

Conference Accomodation and Guesthouse of State North Rhine Westphalia

Hotels and BBs

Hotel lists (prices could change without notice).

View UPEC2011 Hotel in a larger map

Soest – the city

The Historic Town Soest

Having been granted city status by Emperor Frederick Barbarossa in 1152, Soest started to gain importance, and in 1180 it became the capital of Cologne-Westphalia, one of the metropolises of the Middle Ages. The turning point in history was the so-called "Soester Fehde"(the feud of Soest) in which the Hanseatic city broke away from Cologne and lost importance due to its political and economic isolation.

The architectural styles of old town center is homogeneous. From the city wall complex, of which two thirds have been preserved, visitors can get a good panoramic view of the city with its more than 600 architectural monuments, dating from the 8th century.

INTERNATIONAL STEERING COMMITTEE

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R. Turri (Italy)

41
A Smart Photovoltaic Generation System Integrated with Lithium-ion Capacitor Storage

Kaoru Koyanagi Yusuke Hida Yuki Ito Koichiro Yoshimi Ryuichi Yokoyama
Waseda University, kkoyanagi@aoni.waseda.jp, Masayuki Inokuchi Tadaharu
Mouri Junichi Eguchi, Advanced Capacitor Technologies, Inc., inokuchi@jeol.co.jp

Abstract
An innovative and smart photovoltaic generation system integrated with lithium-ion capacitor storage is newly proposed for contribution to stable operation of small and isolated grid. The proposed PV generation system employs concept of virtual synchronous generator for the power control by charge/discharge of capacitor. The contribution to stable operation of small model grid was demonstrated with simulations.
Index Terms - Photovoltaic generation, Renewable energy, Smart grid, Virtual synchronous generator, Capacitor storage, Frequency control

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The Influences of Decoupling Elements on the Testing of Low Voltage Varistor and Zener Diode

Waluyo, Lecturer at Electrical Engineering Department, National Institute of Technology, Bandung, E-mail : waluyo@itenas.ac.id, Yan Maret Hutasoit, Alumnus at Electrical Engineering Department,, National Institute of Technology, Bandung

Abstract
This paper presents the research results of the influence of decoupling elements as representation of inductive property. The main equipment of the research were impulse generator, spark gap and varistor arresters as protective devices, storage oscilloscope and wires. The impulses were injected to the arresters through the decoupling elements, and recorded by the oscilloscope. The decoupling elements consisted of three types, namely ferrite, iron and air core decoupling elements. The wires those wound on the cores were made of copper. The results indicated that the inductances and capacitances for ferrite, iron and air cores were 133.6 μH and 8.0 μF, 14.7μH and 38.6 μF and 2.2 μH and 27.99 μF respectively. Based on the oscilloscope display, the first, second and third highest oscillations of the impulse voltages were for the ferrite, iron and air cores of the decoupling elements respectively. As an addition, the impedance of the ferrite core decoupling element was the highest among other decoupling elements. Therefore, the ferrite core decoupling element was the most suitable for an impediment the surge overvoltages.
Index Terms - arrester, ferrite, impulse, decoupling element, oscillation.

The Influences of Decoupling Elements on the Testing of Low Voltage Spark Gap and Varistor

Publisher: VDE Cite This PDF

- Waluyo ; Yan Maret Hutasoit All Authors

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Published in: 2011 46th International Universities' Power Engineering Conference (UPEC)

Date of Conference: 05-08 September 2011 **Publisher:** VDE

Date Added to IEEE *Xplore*: 19 January 2012 **Conference Location:** Soest, Germany

Print ISBN:978-3-8007-3402-3

Authors
Keywords
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Published: 2018

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The Influences of Decoupling Elements on the Testing of Low Voltage Spark Gap and Varistor

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Yan Maret Hutasoit
Alumnus at Electrical Engineering Department,
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***Abstract*-This paper presents the research results of the influence of decoupling elements as representation of inductive property. The main equipment of the research were impulse generator, spark gap and varistor arresters as protective devices, storage oscilloscope and wires. The impulses were injected to the arresters through the decoupling elements, and recorded by the oscilloscope. The decoupling elements consisted of three types, namely ferrite, iron and air core decoupling elements. The wires those wound on the cores were made of copper.**

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***Index Terms*--arrester, ferrite, impulse, decoupling element, oscillation.**

I. INTRODUCTION

Transient overvoltages due to lightning and switching surges cause steep build-up of voltage on transmission lines and other electrical apparatus [1]. Electrical systems which contain electronic devices are susceptible to damage due to overvoltages caused by various sources. These sources are switching electromagnetic pulses, lightning electromagnetic pulses, nuclear electromagnetic pulses, electrostatic discharges and direct lightning strokes. Basically, there are two types of overvoltages caused by atmospheric discharges, direct or nearby strikes and distance strikes. Reflected or travelling waves are produced in transmission lines by cloud-to-cloud lightning, and overvoltages are induced in systems by lightning in the surrounding area [2].

When a discharge current flows in a conductor, it generates longitudinal and transverse voltages. The longitudinal voltage generated between the conductor and the metal cable screen, creates stress on the insulation of the connected device between its input terminal and the earthed enclosure. A transverse voltage is established between the conductors and this exerts pressure on the input circuit of the connected device [2].

Surge currents can be coupled ohmically, inductively and capacitively on signalling lines of extended systems. Low-voltage installations can usually only withstand impulse voltages of several kV and therefore are susceptible to damage, or even destruction, by the tens of kV produced by distant strokes, or 100 kV produced by direct strokes. The withstand voltage of some electronic devices can be as low as 10V [2].

Overvoltage protectors (overvoltage limiters) are components, protective circuits and devices which limit overvoltages in systems to admissible values. Typical components currently used in overvoltage protectors and protective circuits are discharge gaps, varistors and suppressor diodes. For overvoltage limitation, the important characteristics are protection level, impulse current discharge capacity and very short response time. They are recommended for use in protectors together with decoupling links [2].

Protective circuits reduce overvoltages step-by-step by means of series connected limiting components and decoupling links. The overvoltage-limiting elements are thus arranged with decreasing limiting voltage and power rating. The decoupling links can be resistors, inductors capacitors or filters. Within the staggered protective stages, the rating of the coarse protection depends on the requirements of the lightning protection potential equalisation. Sensitive protectors are rated according to the overvoltage protection sensitivity of device to be protected and often these are inserted prior to the inputs to the device. The decoupling links between coarse and fine protection should be dimensioned so that they can safely withstand the potential differences that arise when surge currents are discharged, and so that in normal system operation they do not influence the data flow [2].

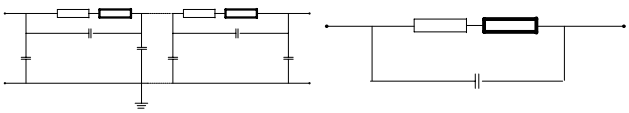
For impulse voltages with a finite front steepness the ignition time lag is practically counted from that instant at which the static breakdown voltage is exceeded. For a complete breakdown to occur, the duration of the stress must be greater than the corresponding ignition lag [3].

For over voltage following lightning strokes, the time required to reach the peak value is of order of 1 μs. Voltages generated in a laboratory to simulate these are called lightning impulse voltages [4]. An impulse voltage is a unidirectional voltage which without appreciable oscillations, rises rapidly to a maximum value and falls more or less rapidly to zero. Small oscillations are tolerated, provided their amplitude is less than 5% of the peak [5]. Current and voltage surges are

usually of high amplitude and short in time duration, and span different in frequency spectrum with a broad band in harmonics and as special distorted waveforms [6]. The rate of voltage rise of such a travelling wave is at its origin directly proportional to the steepness of the lightning current, which may exceed 100 kA/μs, as the voltage levels simply be calculated by it multiplied by the effective surge impedance [7].

Inductance, resistance and capacitance for a coil are influenced by coil and core materials, and coil form. The inductance and resistance behaviours are also influenced by a subject waveform. The resistance is also affected by skin and proximity effects. The air behaviour as a coil core material does not experience a saturation, as given electromagnetic field. As a vanished field, the air will fast recover. Ferrite core increases the self-inductance when low current, and it has small effect when high current or saturation. Iron core also increases the self-inductance of coil. It has faster saturated area and higher eddy current than the ferrite core [8].

A decoupling element equivalent circuit is distributed RLC circuit, involve coil resistance, inductance, and capacitance, and capacitance between coil and ground. A simplified analysis is done by making a lumped equivalent circuit. Figure 1 shows a decoupling element equivalent circuit. In this case, it has small dimension or small turn number, so that a lumped equivalent circuit is enough to represent the coil. The resistance R_{ac} is the resistance that representation coil ac resistive component, as addition with the resistance of eddy current loss representation. The coil resistance R_{ac} involves resistive component R_{dc}, skin and proximity effects [8].



(a) Distributed (b) Lumped

Fig. 1. Decoupling element equivalent circuit

The purpose of the research was to investigate the influence of decoupling element parameters on the behaviours of impulse waves, based on their characteristics. The decoupling parameters were the core types (ferrite, iron and air cores) and the turn number. Meanwhile, their characteristics were revealed by the inductances, capacitances, resistances and impedances. Finally, the behaviours of impulse waves were the condition of waves, such as their amplitudes and oscillations.

II. Testing Methods of Decoupling Elements

The main testing circuit consisted of hybrid generator, arrester, and decoupling elements. The measuring instruments were on the generator panel display and the oscilloscope screen for impulse voltage and current peaks. Figure 2 shows the schematic testing circuits for the impulse on the low voltage arresters and decoupling elements cascade.

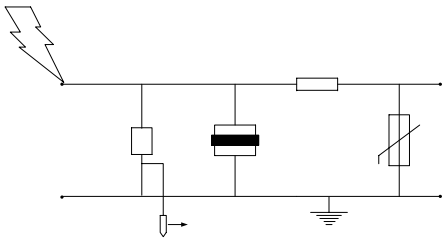


Fig. 2. Schematic cascade circuits for the impulse tests

The instrument specification for the decoupling tests is described below.

Impulse Generator
Type : hybrid
Opened circuit voltage (1.2/50 μs) : 1 kV -10 kV
Short-circuit current (8/20 μs) : 3 kA (maximum)
Impedance = 2 Ω

Spark gap arrester
Rated voltage U_c = 350V/50Hz
Lightning impulse current (10/350 μs) I_{imp} = 75 kA
Voltage protection level (1.2/50 μs) $U_p \leq 1$ kV
Response time $t_A \leq 100$ ns
Arrester varistor
Rated voltage U_c = 100 V
Nominal discharge current I_{sn} = 20 kA
Voltage protection level:
- on 5 kA (8/20 μs), $U_p \leq 1$ kV
- on I_{sn} Up≤ 1.5 kV
Response time $t_A \leq 25$ ns
Operation temperature range = - 40°C … +80°C

Varistor arrester
Rated voltage U_c = 100 V
Nominal discharge current I_{sn} = 20 kA
Voltage protection level : on 5 kA (8/20μs), $U_p \leq$ 1 kV, on I_{sn}, $U_p \leq$ 1.5 kV
Respon time $t_A \leq 25$ ns
Operation temperature range = - 40°C … +80°C

Decoupling Element
Wire : copper AWG 17
Wire diameter : 0.8 mm
Core types : iron, ferrite and air
Core size : length = 97 mm, diameter = 8 mm

The arresters under tests were connected with the impulse generator to the positive impulse (kV) and ground. The voltage divider on the impulse generator was connected to the oscilloscope to display the impulse waves. The impulse voltage would discharge on a certain level and it directly subjected the arrester.

Arresters cascade tests were to make a parallel circuit, where the location between spark gap and varistor was inserted a decoupling element. The other tips of the arresters were connected to the ground. The numerical data were obtained on the impulse generator display for the peak values and the impulse current and voltage waves on the oscilloscope screen. Figure 3 shows the decoupling elements which were tested by impulse currents with the arresters, where they consisted of iron, ferrite and air cores.

(a) Iron core decoupling element (b) Ferrite core decoupling element (c) Air core decoupling element

Fig. 3. Decoupling elements on the arrester impulse tests

III. Testing Results and Discussion

Table 1 lists the parameter values of the decoupling element measurement results. For the more turns, the iron core decoupling resistance would be higher. Nevertheless, the inductance would be lower than that the ferrite core decoupling element and higher than that the air core one. On the other hand, the capacitance of iron core decoupling element was the highest, followed by the air core and ferrite core elements respectively.

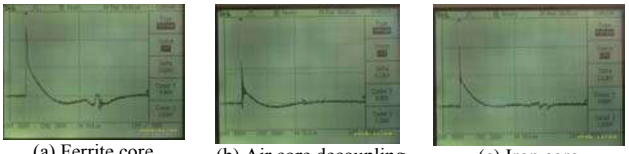
The ferrite core gave significant change of inductance for different turn, i.e. from 133.6 μH on the 42 turns, it became 273 μH for 82 turns. It was followed by the iron core one, i.e. the inductance was 14.7 μH on the 42 turns, it became 129 μH on the 82 turns. The last was the air core decoupling element.

Nevertheless, the capacitances were the reciprocal of the inductances. The capacitances would reduce as the turns increased. The highest capacitance was the iron core, 38.6 μF for the 42 turns and it became 11.45 μF for the 82 turns. It was followed by the air core decoupling element, i.e. 27.99 μF for the 42 turns and it became 8.83 μF for the 82 turns. The last was the ferrite core decoupling element, 8 μF for 42 turns and it became 4.6 μF for the 82 turns. Thus, due to the ferrite core decoupling element as the highest inductance so that it mostly impeded the current impulses, as a consequence of high impedance.

TABLE I
Measurement Result Values of Decoupling Elements

Turns		42	82
Iron core	R (Ω)	0.054	0.416
	L (μH)	14.7	129
	C (μF)	38.60	11.45
Ferrite core	R (Ω)	0.043	0.076
	L (μH)	133.6	273
	C (μF)	8.0	4.6
Air core	R (Ω)	0.02	0.046
	L (μH)	2.2	27.6
	C (μF)	27.99	8.83

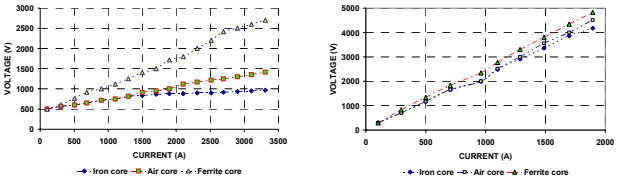
The ferrite core decoupling element impedance was the highest among air and iron core element impedances. Thus, the highest voltage drop was on the ferrite core decoupling element, and this case was suitable with the impulse test results as shown in Figure 4. Other impulses had also considerably voltage drops.



(a) Ferrite core decoupling element (b) Air core decoupling element (c) Iron core decoupling element

Fig. 4. Voltage drop waveforms on 82 turn coils and 2 kV input voltage

Figure 5 shows the decoupling element V-I characteristics for the cores and both turns. The ferrite core decoupling element had the highest voltage drop among remaining elements for a same current. This case is shown distinctly on the 42 turn elements. Therefore, the ferrite core decoupling element could make that a spark gap arrester would operate faster than the remaining elements. As a comparison, this case is shown in Figure 6, where the impedance would decrease drastically.



(a) N = 42 (b) N = 82

Fig. 5. Decoupling element V-I characteristics

Figure 6 shows the characteristics of decoupling element impedance against the current with 42 turns. It indicates that the Ferrite core decoupling element had extremely distinct characteristics of impedance. The R, L, and C parameters of decoupling elements were measured by the 2 kHz measuring frequency. These measurements did not change significantly until tens kilohertz.

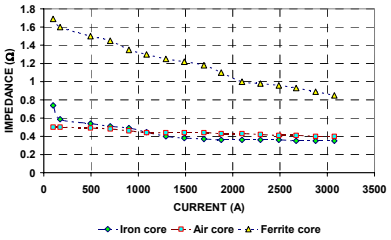


Fig. 6. Z-I characteristics of decoupling element with 42 turns

The material permeability could be calculated by a decoupling element inductance calculation. A calibration was done by the core decoupling element measurements. After that, the core and ferrite material permeability were obtained. The core and ferrite relative permeability could be obtained by using the relation of comparison between iron and air core inductances, and ferrite core inductance. Table 2 shows the permeability of decoupling element cores.

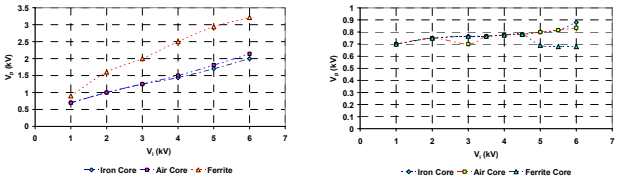
TABLE II
DECOUPLING ELEMENT PERMEABILITY

Number of turn (N)	L (μH) Measurements	$\mu_{rFerrite}$	μ_{rIron}
42	2.2	15.364	6.682
82	27.6	9.891	4.674

On the tests with hybrid generator, the voltage-current curves did not show a saturated condition yet, where they were mostly linear. The iron core decoupling element impedance was different from the air one, because hysteresis and eddy' current losses had roles on them.

These data were use to determine decoupling element drop voltages in an arrester cascade protective coordination design. The point of view was a change existence of element impedance as function of current, so that the R, L and C parameter determinations were not enough to determine the impedance on the current flow circuit thoroughly yet.

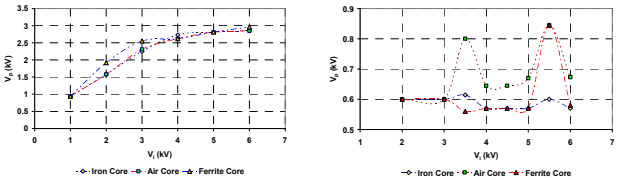
The testing results of the arrester cascades on the primary sides, i.e. the chopped voltages were given in the graphical forms as Figure 7 below. It shows the characteristics of impulse voltages versus chopped waves on the 42 turn arrester cascade decoupling element on the primary (a) and the secondary (b) sides.



(a) Primary side (b) Secondary side

Fig. 7. Vi-Vp characteristics of cascade arrester on 42 turn decoupling elements

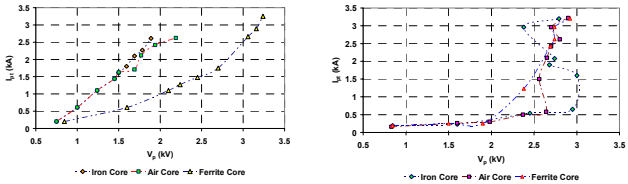
Figure 8 shows the characteristics of impulse voltages versus chopped voltages on the 82 turn arrester cascade decoupling elements on the primary (a) and secondary (b) sides.



(a) Primary side (b) Secondary side

Fig. 8. V_i-Vp characteritics of 82 turn arrester cascade decoupling elements

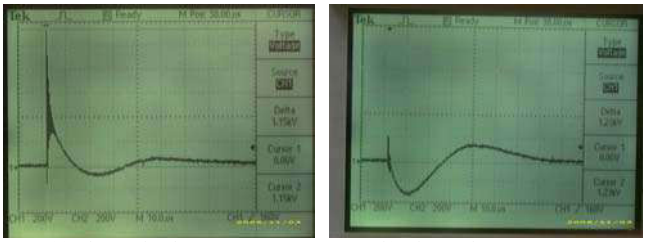
The characteritics of current distribution in the cascade, i.e. the current that flowed on the secondary and primary (total current) sides of varistor are in Figure 9(a) below. This figure shows the characteristics of chopped currents versus chopped voltages on the 42 turn arrester cascade decoupling element. Furthermore, Figure 9(b) shows the characteristics of the 82 turn arrester cascade decoupling element.



(a) 42 turns (b) 82 turns

Fig. 9. Characteristics of current distribution on the 42 and 82 turn arrester cascade decoupling elements

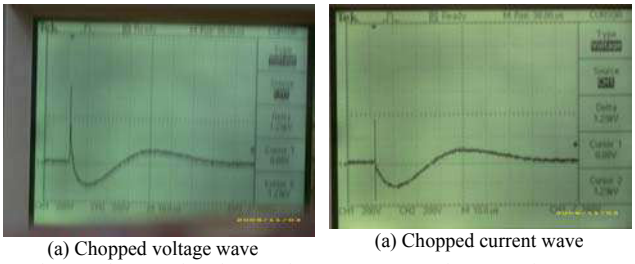
We see that based on the impedance and drop voltage graphics, the ferrite core decoupling element was the fastest for the arresters to operate. This case was also proven by the cascade tests as shown in Figure 10 until 12. The spark gap arrester always operated fastest using the ferrite core decoupling element, because the drop voltage was higher than the summation of chopped voltage on the varistor. Figure 10 shows the cascade voltage and current waves on the 82 turn air core decoupling element.



(a) Chopped voltage wave (b) Chopped current wave

Fig. 10. The cascade voltage and current waves on the 82 turn air core decoupling element

Figure 11 shows the chopped voltage and current waves of the 82 turn iron core decoupling element of cascade arrester.



(a) Chopped voltage wave (a) Chopped current wave

Fig. 11. The cascade voltage and current waves on the 82 turn iron core decoupling element

Figure 12 shows the chopped voltage and current waves of the 82 turn ferrite core decoupling element of cascade arrester.

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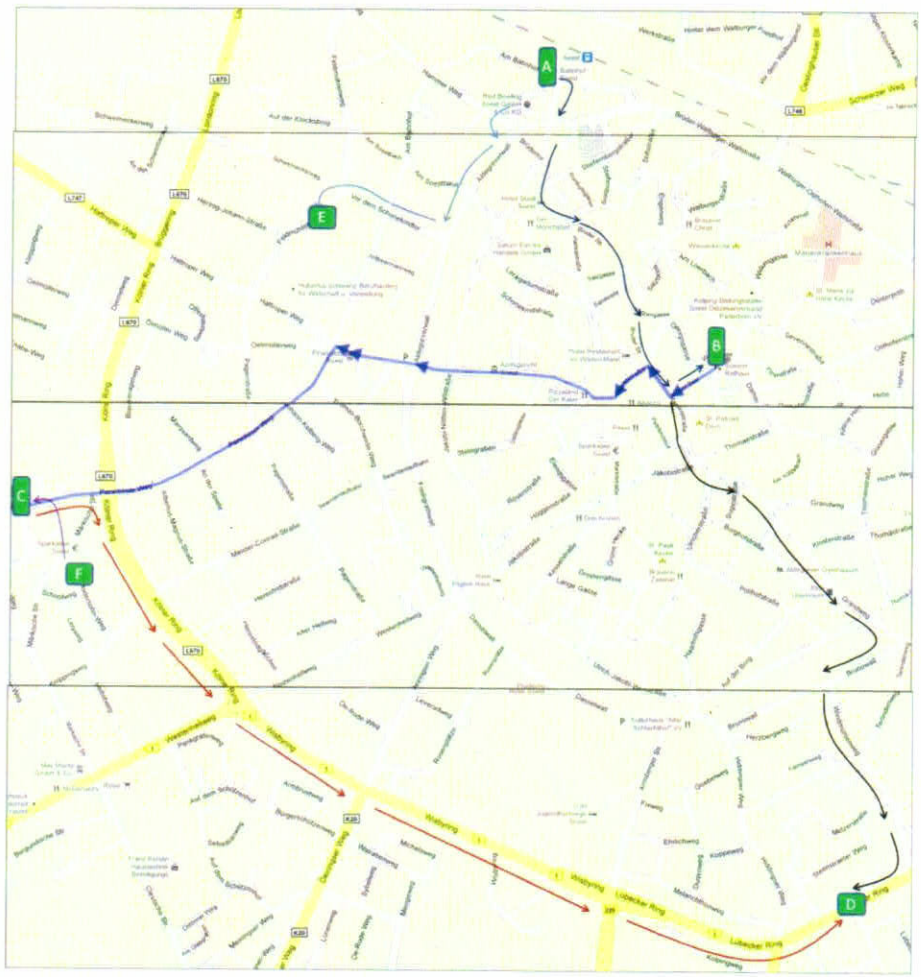

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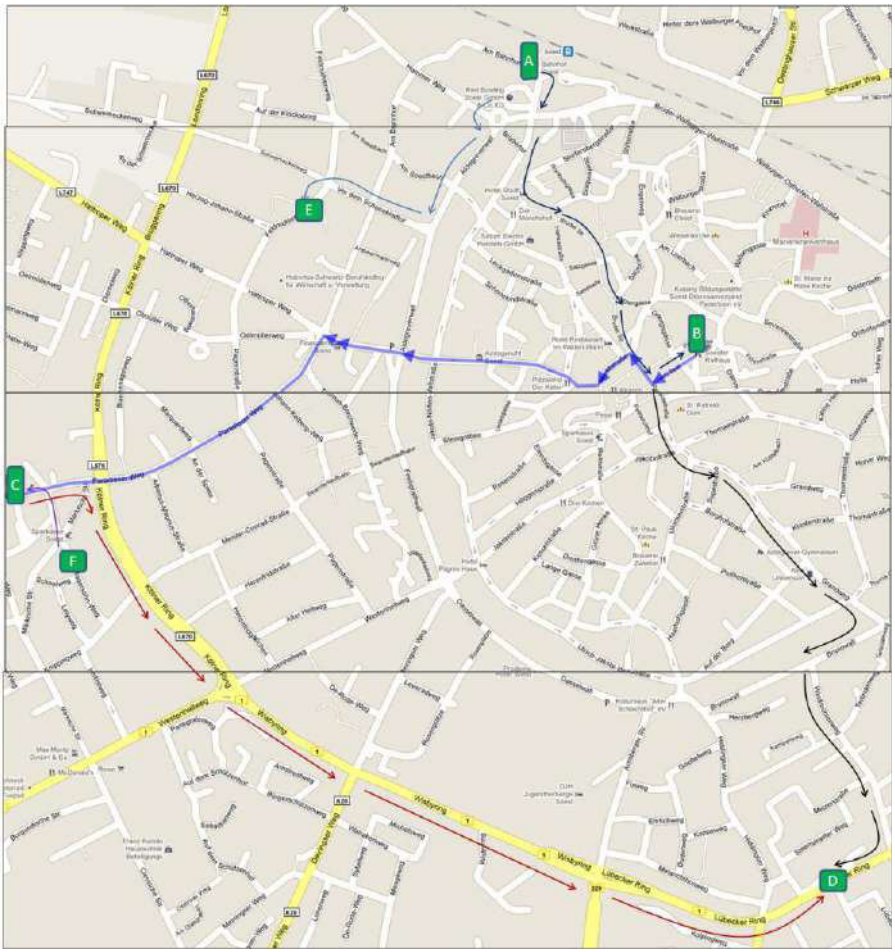

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