POWER QUALITY Tuesday, June 19, 2001

Room Paris

9:00 – 9:20 **Official Opening of the PCIM 2001 Conference for all PCIM participants**

9:20 – 10:05 **KEY-NOTE Paper for all PCIM participants**

POWER ELECTRONICS SOLUTIONS FOR DISTRIBUTED POWER GENERATION

R. W. Zehringer, P. Joerg, M. Suter, ABB Corp. Research Ltd., SWITZERLAND

Recently there has been a lot of attention in the media and in the industrial circles on the issue of deregulation of power distribution markets. At the same time power shortages often caused by the insufficient transmission capacity together with increasing power quality problems prompted the search for a solution in the form of distributed power generation.

There are several competing technologies in the distributed power generation arena that are believed to offer a solution for many of the today's power quality problems and that fit well in the vision of the deregulated power distribution markets. Some of the most promising technologies in this arena are microturbines, fuel cells, wind power systems and photovoltaic plants. However, in order to utilize the full potential of these technologies a power electronic solution in the form of power conditioning system (PCS) is required almost without an exception.

Therefore, this paper will make a survey for power electronics solutions that quite naturally serve a combined function of an interface to power utility grid, fault protection function and can be configured to serve various power quality functions. In addition, power electronics based PCS systems can be remotely controlled and monitored to allow a real time optimization of power generation and can allow aggregation of distributed power generation resources into a so called "Virtual Utility". Finally, this paper will emphasis new opportunities in application of power electronics solutions that arise from the natural synergy of power electronics systems with the information technologies.

10:05 – 10:30 Coffee Break and moving of conference participants to different sessions

10:30 Starting oral session PQ 1

Room Oslo **Session PQ 1**

UPS, DISTRIBUTED GENERATION, RENEWABLE ENERGY (I)

Chairman: J. P. Beaudet, MGE UPS, FRANCE

10:30 – 11:00 **COSTS OF POOR POWER QUALITY IN DEREGULATED MARKET**
G. Brauner, Vienna University of Technology, AUSTRIA

11:00 – 11:30 **TEST BENCH FOR LIFETIME TESTING OF HYBRID ELECTRIC VEHICLE BATTERY PACKS**
P. Bentley, D.A. Stone, University of Sheffield, UK

11:30 – 12:00 **SOME EXPERIENCES WITH SMES SUPERCAPACITORS IN UPS APPLICATIONS**
N. Blacha, AEG SVS Power Supply Systems, GERMANY

12:00 – 12:30 **UPS AND DECENTRALIZED POWER GENERATION**
H. Darrelmann, Piller, GERMANY

POWER QUALITY Tuesday, June 19, 2001

12:00 – 2:30	Lunch, Restaurant CCN West first floor

2:30	Starting oral sessions PQ2 and PQ 3 running parallel in different rooms

Room Oslo **Session PQ 2**

HIGH POWER FACTOR CONVERTERS (I)

Chairman: J. W. Kolar, ETH Zurich, SWITZERLAND

2:30 - 3:00 **THREE-PHASE CURRENT-SOURCE-TYPE PWM PFC RECTIFIER**
N. Yasuyuki, Nihon University, JAPAN

3:00 - 3:30 **INEXPENSIVE HIGH POWER FACTOR REGULATORS FOR RESISTIVE LOADS**
P. Bolognesi, D. Casini, University of Pisa, ITALY

3:30 - 4:00 **FROM THE WELDING ARC TI THE MAINS SUPPLY VIA THE INVERTOR POWER SOURCE**
A. Hedes, I. Sora, University Politehnica of Timisoara, ROMANIA

4:00 – 4:30	Coffee Break

4:30 - 5:00 **DIGITAL CONTROL IMPROVES THREE-PHASE INDUCTION HEATER PERFORMANCE**
I. Sewell, Inductelec Ltd., D.A. Stone, C.M. Bingham, University of Sheffield, UK

5:00 - 5:30 **EXPERIMENTAL EVALUATION OF A THREE-PHASE THREE-SWITCH BUCK-TYPE UNITY POWER FACTOR CORRECTOR**
M. Baumann, Technical University Vienna, AUSTRIA J. W. Kolar, ETH Zurich, SWITZERLAND

Room Prag **Session PQ 3**

FACTS, DYNAMIC VOLTAGE RESTORER

Chairman: Y. Nishida, Nihon University, JAPAN

2:30 - 3:00 **FAULT CURRENT LIMITERS AS POWER QUALITY DEVICE IN DISTRIBUTION NETWORKS - TECHNIQUE; EXPERIENCES; TRENDS**
P. Behrens, E. K. Stachorra, EUS GmbH, A. Cieleit, E.ON Engineering, GERMANY

3:00 - 3:30 **OPTIMIZED APPLICATION OF STATIC TRANSFER SWITCHES**
R. Briest, Piller, GERMANY

3:30 – 4:00 **SHORT-TIME-STORAGE-SYSTEM WITH DOUBLE-LAYER-CAPACITORS, CONNECTED TO THE DC-LINK OF VOLTAGE SOURCE CONVERTERS**
H. Späth, K.-P. Becker, University Karlsruhe, GERMANY

POWER QUALITY Tuesday, June 19, 2001

4:00 – 4:30	Coffee Break

4:30 – 5:00 **VOLTAGE SAG PROTECTION FOR SENSITIVE LOADS**
R. Schoettler, American Superconductor, GERMANY

5:00 - 5:30 **DYNAMIC VOLTAGE RESTORER**
T. Sezi, Siemens AG, GERMANY

The PCIM Exhibition runs the whole day from 9:00 – 5:00, ground floor, Hall 12.

Make your personal time schedule for the day and reserve time for visiting this worldwide leading PCIM and POWER QUALITY Exhibition.

POWER QUALITY Wednesday, June 20, 2001

Room Paris

8:30 – 9:15 **KEY-NOTE Paper for all PCIM participants**

CONTROL SYSTEM PROTOTYPING, PRODUCTIONIZING AND TESTING WITH MODERN TOOLS

H. Hanselmann, F. Schütte, dSpace, GERMANY

Tools for the rapid development of control systems have found strong acceptance in certain industries, especially in the automotive industry. Penetration of tool usage seems to be much weaker in the areas of drives, motion control systems and power electronics. There may be reasons for sticking to more traditional development processes, but one reason should not be the cause - lack of awareness.

This presentation shows what modern tools can do today in the development process, why the automotive industry is so keen on using them and driving their further development, and how early adopters of such new tools and methodologies in the drives, motion control and power electronics industry successfully apply them.

The areas covered are simulation and rapid control prototyping, automatic production code generation and hardware-in-the-loop testing. Automatic production code generation is considered of high potential for complex developments and will receive particular attention.

9:15 – 9:30 Coffee Break and moving of conference participants to different sessions

9:30 Starting oral session PQ 4

Room Oslo **Session PQ 4**

HIGH POWER FACTOR CONVERTERS (II)

Chairman: G. Brauner, Technical University Vienna, AUSTRIA

9:30 - 10:00 **VOLTAGE TRACKING PFC - A SIMPLE, LOW COST WAY TO IMPROVE THE EFFICIENCY OF PC POWER SUPPLIES WITH ACTIVE PFC**

A. Lefedjiev, J. Leisten, NMB-Minebea Electronics, UK

10:00 - 10:30 **EVALUATION OF A DELTA-CONNECTION OF THREE SINGLE-PHASE UNITY POWER FACTOR RECTIFIER SYSTEMS IN COMPARISON TO A DIRECT THREE-PHASE RECTIFIER REALIZATION**

J.W. Kolar, ETH Zurich, F. Stöerer, Technical University Vienna, AUSTRIA

10:30 - 11:00 **MANAGEMENT OF THE HARMONICS UPSTREAM OF THREE-PHASE UPS: INNOVATIVE SOLUTION BASED ON PFC (POWER FACTOR CORRECTION) IGBT RECTIFIER**

S. Bernard, G. Besset, D. Gonzalez, MGE UPS Systems, FRANCE

11:00 - 11:30 **SINGLE AND THREE PHASE RECTIFIERS WITH ACTIVE POWER FACTOR CORRECTION FOR ENHANCED MAINS POWER QUALITY**

A. Lindemann, IXYS, GERMANY, J.W. Kolar, ETH Zurich, SWITZERLAND

11:30 – 2:00 Lunch , Restaurant CCN West first floor

POWER QUALITY Wednesday, June 20, 2001

1:30	Starting oral session PQ 5

Room Oslo **Session PQ 5**

ACTIVE and HYBRID FILTERS

Chairman: P. Bauer, Delft University of Technology, THE NETHERLANDS

2:00 - 2:30 **AN INVESTIGATION ON SECOND HARMONIC FILTER FAILURE AS PART OF A STATIC VAR SYSTEM USED FOR FLICKER CONTROL IN A 115 KV LINE**
J. Castaneda, Central Arizona Project, Tucson, USA

2:30 - 3:00 **A NEW EFFICIENT FILTERING SYSTEM HAVING PASSIVE FILTERS WITH CAPACITORS IN PARALLEL WITH DIODES FOR LARGE-RATED HARMONIC CURRENTS**
D. Alexa, A. Lazar, T. Goras, I. Pletea, Technical University of Iasi, ROMANIA, E. Rosu, University "Dunarea de Jos" of Galati, ROMANIA

3:00 - 3:30 **STATE ANALYSE AND ASPECTS REGARDING POWER QUALITY FOR THREE PHASE NETWORKS RUNNING UNDER UNBALANCED STEADY STATE**
V. Varvara, Technical University Iasi, ROMANIA

3:30 - 4:00	Coffee Break

4:00 - 4:30 **THE PRACTICAL REALISATION OF DAMPING FEEDBACK IN DFM CONTROL SYSTEM**
A. Popenda, Technical University of Czestochowa, Czestochowa, POLAND

4:30 - 5:00 **CONTROL SCHEME FOR SELECTIVE COMPENSATION OF REACTIVE POWER UNDER DISTORTED AND UNBALANCED SOURCE**
P. Singh, R. Varma, CEERI, INDIA, J. M. Pacas, Uni-GH Siegen, GERMANY

5:00 - 5:30 **MITIGATION OF RECTIFIER HARMONICS BY SHUNT HARMONIC IMPEDANCES**
W. Ryckaert, J. Ghijselen, J. Melkebeek, Ghent University, BELGIUM

6:00 **Get Together Party**

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POWER QUALITY Thursday, June 21, 2001

Room Paris

8:30 – 9:15 **KEY-NOTE Paper for all PCIM participants**

KEY DEVELOPMENTS FOR SUPERCAPACITIVE ENERGY STORAGE: POWER ELECTRONIC CONVERTERS, SYSTEMS AND CONTROL

A. Rufer, Laboratoire d'Electronique Industrielle LEI, EPFL, SWITZERLAND

Supercapacitors represent one of the newest innovations in the field of electrical energy storage, and will find their place in many applications where energy storage is needed, and can help to the smoothing of strong and short time power solicitations of a distribution network. Other system developments are going on, opening new fields in engineering sciences, based on new possibilities in the field of electrical energy storage.

In comparison with classical capacitors, these new components allow a much more higher energy density, together with a high power density. Even if the energy density is not comparable with that one of electrochemical accumulators, the possible energy amount and storage time is compatible with many industrial requirements. In transportation systems, as a first example, the energy needed to relay two bus-stations can easily be transferred from a fixed supercapacitive storage device to another mobile one placed on the bus during passenger transfer time, allowing so the use of electrical propulsion without trolleys. Many other systems for better share of energy and instantaneous power amounts will soon appear as industrial products.

This contribution shows some actual research and development projects, running at university level, but in connection with specialists from the corresponding application field. Innovative and promising solutions and technologies are investigated, which need of course clarification of their actual industrial and economical compatibility, they can also be seen as future solutions for next decades, in relation with the tendency of getting weaker distribution of electrical energy.

9:15 – 9:40 Coffee Break and moving of conference participants to different sessions

Room Oslo **Session PQ 6**

HARMONICS, MAINS IMPEDANCE, EMV

Chairman: John Mungenast, Silicon Seniors International, USA

9:40 - 10:10 **SIMULATION OF POWER QUALITY PARAMETERS OF EMBEDDED GENERATORS**
D. Schulz, R. Hanitsch, Technical University Berlin, GERMANY

10:10 - 10:40 **THE SPECTRAL GRID IMPEDANCE OF DISTRIBUTION NETWORKS AS AN ANALYSIS KEY TERM**
E. Handschin, W. Horenkamp, Th. Wiesner, University of Dortmund,
E. Stachorra, EUS GmbH, GERMANY

10:40 - 11:10 **COORDINATION RULES FOR POWER QUALITY IN WIND PARKS**
M. Berger, G. Brauner, Vienna University of Technology, AUSTRIA

11:10 - 11:40 **POWER QUALITY IMPROVEMENTS OF SOLAR SYSTEM: SIMULTANEOUS-INVERTER OPERATION RESULTS IN REDUCTION OF DISTORTIONS**
D. Schulz, B. Lchamsuren, R. Hanitsch, Technical University Berlin, GERMANY

POWER QUALITY Thursday, June 21, 2001

11:40 - 12:10 **EMC PERFORMANCE OF POWER DRIVE APPLICATIONS UNDER REAL LOAD CONDITIONS**
W.L. Klampfer, Schaffner EMV, SWITZERLAND

12:10 – 1:30 Lunch , Restaurant CCN West first floor

1:30 Starting oral session PQ 7

Room Oslo **Session PQ 7**

UPS, DISTRIBUTED GENERATION, RENEWABLE ENERGY (II)

Chairman: T. Sezi, Siemens PQ, GERMANY

1:30 – 2:00 **NEW E-ECONOMY: POWER PROTECTION AND POWER AVAILABILITY FOR THE MISSION - CRITICAL INTERNET DATA CENTERS**
S. Bernard, A. Rouyer, G. Trochain, MGE UPS Systems, FRANCE

2:00 – 2:30 **EVALUATION OF ELECTRICAL SYSTEM FOR OFFSHORE WINDFARMS**
P. Bauer, Delft University of Technology, NETHERLANDS

2:30 – 3:00 **FUZZY LOGIC APPLICATION FOR IMPROVING CAPTURED ENERGY FOR VARIABLE SPEED AND BLADE PITCH WIND TURBINES**
C. Batista, MADE Energias Renovables, SPAIN, M.A.M. Prats, J.M. Carrasco, E. Galván, J.A. Sánchez, Universidad de Sevilla, SPAIN

3:00 – 3:30 **APPLICATIONS WITH PROTON EXCHANGE MEMBRANE (PEM) FUEL CELL-SYSTEMS FOR A DEREGULATED MARKET PLACE AND FIRST EXPERIENCES IN EUROPE**
M. Scheefer, Alstom Ballard, GERMANY

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