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Mitigating the Effects of Voltage Sag and Flicker on Distribution Lines with Solid-State Switched Capacitors

Chris Sermon, P.E.
Power Quality Systems, Inc.



Residential, commercial, and industrial growth along long distribution feeders has increased the awareness and impact of poor power quality events such as voltage sag and flicker. Voltage sag and flicker can have a commercial and economic impact on both suppliers and users of electric power.

The distribution-class Static VAR Compensators (SVC) provides an economical and field proven solution to the problems of voltage sag and flicker. This presentation will provide an overview of the distribution-class SVC including power and control implementations, application considerations and application examples.

Mr. Sermon graduated from Georgia Institute of Technology with both a Bachelors and Masters in Electrical Engineering. Currently, he works for Power Quality Systems in West Mifflin as a Senior Engineer. Chris is a member of the IEEE and a Registered Professional Engineer in the Commonwealth of Pennsylvania.

Place:	Westinghouse Energy Center, Monroeville
Date:	December 9 th
Social:	6:30 PM
Program:	7:00 PM

This meeting will be of particular interest to the members who belong to the PES and IAS societies. For more information or to register, contact Dave Vaglia at (724) 733-6513 or davevaglia@ieee.org by December 2.

Directions: From downtown Pittsburgh, take the Parkway East Outbound to Exit 14A (Monroeville). Cross the traffic light (Business 22) and proceed on Rt. 48 South for two traffic lights. Turn left onto Northern Pike. Proceed East ~ 0.2 miles and turn right at the first traffic light onto Westinghouse Drive. Travel 0.7 mile to the three flags where the main entrance is located. Parking in the evening will be plentiful in the large area in front of the building. Enter the main entrance. Check with the security inside. You will be directed to the proper auditorium for the presentation.

From PA Turnpike, take Exit 57 (Monroeville). After the toll plaza, get in the left lane (Business-22). At the first light, turn left on to Rt. 48 South and follow the directions shown above.

Nomination of Officers for 2005



The Officer Slate for the 2005 year has been set. The following individuals have agreed to be listed as nominees for the 2005 IEEE Pittsburgh section. Any other member that would like to be considered for one of these positions should contact Harry Hagerty at (412) 492-0943 x226 or hhagerty@ieee.org.

Elections will take place at the ExComm meeting on January 20, 2005 at Point Park College.

To vote by mail, please return a written ballot to:

IEEE Pittsburgh Section
337 Fourth Ave.
Pittsburgh, PA 15222

You may also attend the ExComm meeting and vote in person, or vote by email to Harry Hagerty at hhagerty@ieee.org.

Section Chair
___ Kalyan Sen
___ Write In _____

Secretary
___ John Twigg
___ Write In _____

Vice Chair
___ Ralph Sprang
___ Write In _____

Treasurer
___ Dave Vaglia
___ Write In _____

Winning with Software

James Over

Software Engineering Institute



Regardless of the industry, software is almost certainly used in just about every part of your business. Software controls production, manages inventories, directs warehousing, and runs distribution systems for business. Software is now a critical element of television sets, cell phones, automobiles, and weapon systems.

While the use of technology is growing quickly, getting people to change takes a great deal longer. That is why the people-intensive job of developing software has had essentially the same problems for over 40 years. Unless something is done, the situation won't improve by itself - in fact, current trends suggest it will likely get much worse.

For example, today's typical programmer will inject one software defect for every 7 to 10 lines of code they write. Therefore, even a medium-size software system can potentially have thousands of defects to find and remove during testing. One well-known defect is the so-called "buffer overflow" security flaw exploited by hackers in Windows and Linux software, which is causing billions of dollars in damage to our economy.

Software development is one of the few technical fields where quality is primarily addressed during testing. So why not engineer the quality into the system up-front? This presentation makes the case that nearly every business is involved in the software business. If software is not treated as a critical part of your future, software can not be managed, and then it may be difficult to manage a business' future.

SEI's Team Software Process (TSP) and Personal Software Process (PSP) adapted from the Capability Maturity Model (CMM) will be discussed. While the CMM is an organizational-level commitment, the TSP/PSP processes are project-level. Early use of these processes enabled teams to achieve results, on average, 16 times better than CMM Level 5! In fact, one-third of the teams produced defect-free programs on their very first project.

Computer Society Chair's note: This presentation is the first in an ongoing series of presentations this year on the importance of software quality and technical strategies to improve quality. If your company uses custom software in its business, this is a must-see event!

Place:	Software Engineering Institute, CMU
Date:	December 15 th
Networking:	6:00 PM
Program:	7:00 PM

This meeting will be of interest to any member of Pittsburgh Section IEEE and is hosted by the Computer Society. Reservations must be received by Monday, December 13th. Free parking is available behind the SEI building. Free pizza and soft drinks will be available. Please include whether you'll be eating pizza. To make your reservations, contact John Twigg at (724) 387-2772 or jtwigg@ascent-systems.com.

Future City Pittsburgh Volunteers Needed

The Pittsburgh Region is beginning its sixth year in the National Future City Competition. The number of Middle Schools that have registered in the Pittsburgh Regional Competition has grown each year. The Competition's growth is testimony to the program's unique capacity to challenge students to learn and test new concepts related to engineering and city planning, to apply the mathematics and science they have already learned, to explore their imaginations about what our cities will be like in the future, and to build an example of the result using ingenuity and their own hands. However, another important facet of the Pittsburgh Regional Future City Competition that has allowed it to expand is the associated growth of a cadre of dedicated volunteers. Without volunteers, there would be no competition.

Please, volunteer as a Presentation Aide or Judge. During November and December, judges will review the SimCity files and essays. On Saturday, January 15, 2005 the Pittsburgh Regional Competition will be held at the Carnegie Music Hall in Oakland. Based on past experience we anticipate that we will need more than 120 volunteers to fill the positions of Essay Judges, Disk Judges, Registrars, Model Movers, Room Manager/Timers, Score Keepers, Special Awards Judges, Presentation Judges, Exhibit Area Control Volunteers, Still and Video Camera Operators, and Public Relations Coordinators. Our goal is to identify all volunteers, and make assignments by January 2, 2005. Orientation Meetings for Presentation Aides and Judges will be held as needed in early January.

Please add Your Name to Our 2004-2005 Volunteers List. We welcome the help of anyone who is interested in volunteering his or her time. To qualify as a Presentation Judge, you must have judged before or have attended a Judge Orientation Meeting. If you are interested in registering as a volunteer for the 2005 Future City Competition please take a minute and fill out the Volunteer Registration Form at http://www.futurecitypittsburgh.org/futcityvolunteer_form.htm.

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Current Issues and Problems in Distributed Generation

Joseph L. Koefinger, Life Fellow, IEEE
IEEE Distinguished Lecturer



The conversion of energy has existed since the earliest days of civilization. With the discovery of electrical energy, there has been a constant evolution of technology to convert all forms of primary energy into electricity. Most forms of energy can be stored and used when needed. Storage of electricity is possible and is suitable economically for some applications. The current usage of the electrical transmission and distribution system is designed for the conversion of some primary form of energy to direct utilization. In some instances, electrical energy is stored by converting it to another form, such as chemical energy as in a battery or hydro energy as in pump storage. Today, some energy can be stored in an electric form in capacitors and by the use of super magnetic storage. The demand for electrical energy is rarely constant since it has to follow the needs of the user. The electrical power system as it is known today in the industrially developed countries started as a distributed generation. The need to be able to supply electrical energy on demand caused the evolution of small, isolated generating facilities, into an interconnected power system with the generation usually being located near the source of the primary energy such as coal, hydro and liquid fuels.

As the large interconnected facilities developed, there became a trade off between capacity and reliability. Some planning criteria were developed to define an acceptable level of service for the price being paid for the product, such as limit on the number of outages per year and the duration for different types of customers and different density of customers. These limits are arbitrary and do not provide the customer the opportunity to make a choice on his/her quality of service.

Deregulation of the power industry is changing the playing field and providing customers new opportunities to have more input into the type and quality of their electric service. This is providing an opportunity for the re-birth of distributed energy resources (DER) or distributed resources (DR). The development of the modern DR and its utilization is taking many forms. Some are being operated to back up existing electrical facilities, others are the prime source of electricity, operating individually or in a microgrid and others are being operated as an integral part of the existing electric supply system.

This tutorial will review the evolution of DR, the types of DR and their characteristics, the problems and requirements associated with operations in a microgrid and in the integration with an existing electrical system. Consideration will be given to operation limitations, protection, control, communications and safety issues. There will be a discussion of some typical installations such as combined cycle installation and efficiencies. Some material will address the problems associated with the interconnection of DR on electrical power distribution systems. Key to the success of the discussions will be the understanding of the terminology by all of the participants, including the instructor.

The tutorial will focus on the recent development of IEEE 1547.1 Interconnection of DR and other standards under development in the 1547 series of standards. This will be an interactive tutorial where the participants will have an opportunity to raise issues and have them discussed by the participants.

Place:	Westinghouse Energy Center, Monroeville
Date:	December 2 nd
Social:	6:30 PM
Program:	7:00 PM

This meeting will be of particular interest to the members who belong to the PES and IAS societies. For more information or to register, please contact Dr. Kal Sen at (724) 696-1611 or senkk@ieee.org by November 29th.

Directions: Please refer to the article on the first page for directions.



2005 PES Chapter Outstanding Engineer Award

The Power Engineering Society of IEEE Pittsburgh Section is seeking nominations from local PES IEEE members for the 2005 PES Chapter Outstanding Engineer Award. The Outstanding Engineer Award is designed to recognize members of IEEE/PES Pittsburgh Chapter who have made outstanding contributions to their profession through their technical abilities. The nominees will be judged on the basis of their activities during the past two calendar years (2003 and 2004). Please submit your nominee or nominate yourself, by providing the following information:

Name, IEEE Membership Number, IEEE Grade, Professional Affiliation, Importance of technical contributions, Patents/Proprietary Designs/Papers/Technical Presentations, Description and years of technical distinction and responsibility, Service to IEEE, Service to the engineering profession outside IEEE, and Recognition through other honors.

Interested members should submit their nominations to the Committee Chair, Harry Hagerty, at hhagerty@ieee.org no later than December 31st. The decision of the Award Committee will be considered final. The winner will be acknowledged at the History Dinner in the spring.

Robotic Patient Recovery

Dr. Todd Jochem
Applied Perception



A robotic system currently under development that identifies, recovers, and evacuates wounded soldiers from the battlefield will be discussed. This will provide greater safety for field medics as well as decreasing the number of soldiers necessary for patient handling tasks. It is designed to be cost-effective, using common, off-the-shelf (COTS) components. The system will be capable of performing additional functions such as automated reconnaissance, automated sentry duty, and the retrieval of civilians in disaster zones.

Dr. Todd Jochem is co-founder and president of Applied Perception, a Pittsburgh robotics company specializing in sensor integration, perception, planning, and control. Dr. Jochem has worked on numerous mobile robot and intelligent vehicle applications in the past decade. He led the multi-year, multi-million dollar Automated Highway System project, which showcased numerous fully autonomous on-road vehicles that eventually logged over 10,000 miles of autonomous operation. With Advanced Perception's sister company, AssistWare, he developed a state-of-the-art drowsy driver lane departure warning system called SafeTRAC, which is currently being produced and developed in collaboration with Visteon Corporation. Additionally, he is providing technical leadership for the DARPA-funded PerceptOR project, which focuses on outdoor terrain classification.

Place: 360 Benedum Hall
3700 O'Hara Street
Pittsburgh PA
Date: December 9th
Social: 6:30 PM
Program: 7:00 PM

This meeting will be of particular interest to the members who belong to the Robotics society. For more information or to register, contact Dr. Ron Stone at 412-488-1100 or by email at RStone@ParadigmGenetics.com by December 6, 2004.

Directions: Benedum Hall is located at 3700 O'Hara Street in Oakland, on the University of Pittsburgh main campus. Parking is conveniently located in the O'Hara parking garage across the street, or on the neighboring streets.

Life Member Activities

Please join the Life Member Chapter for an afternoon of information and lunch. The afternoon will start with a pizza lunch, followed by a tour of the George Westinghouse Museum. If you have not been to the museum, or it has been a while since you visited it, you will see a great display of invention and history all brought to you by George Westinghouse, and the company he founded right in this town. Mr. Ed Reis, director of the museum, will be your tour guide, and is a wealth of information.

The second presentation will be Westinghouse Nuclear Programs - History & Current Events. Mr. Howard Brushi, will discuss the history of the nuclear power industry, current new designs that place emphasis on standardization, and the status of pebble bed reactor technology. Mr. Brushi is Executive Consultant for Westinghouse Electric, former Senior VP & CTO Energy Systems Business Group.

Place: The Board Room
George Westinghouse Museum
Wilmerding, PA
Date: December 6th
Lunch: 1:00PM
Program: 1:30PM

The meeting is sponsored by the Life Member Chapter, but is open to all IEEE members. Pizza will be provided by the chapter, with soft drinks complements of the Museum.

An email will be sent to all LMs on the Chapter's email list. All other LMs in the section will receive a notice by mail. This will be the last chapter mailing. All subsequent events will be announced by email and also listed in the Pittsburgh Section Bulletin.

For more information or to make sure there is enough pizza for you, please contact Bob Grimes at r.d.grimes@ieee.org.

Volunteer Judges Needed

Share your knowledge with young scientists and engineers! Register to be a Category Judge for the 66th Annual Pittsburgh Regional Science & Engineering Fair, April 1, 2005 at Heinz Field. Receive free lunch and parking. Enjoy a rewarding experience that requires limited time.

For more information, or to register as a volunteer, please call Lisa Kosick at (412) 237-1534 or register on-line at www.pittsburghsciencefair.org.

