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POWER AND DATA LINE TRANSIENTS

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It is a great pleasure to introduce the authors contributing to this session on ***Power and Data Line Transients***, a session that will bring new ideas, or bring changes to old ideas, to the shared body of knowledge on this subject. With the ever-increasing dependency of our society on electronic devices, the need for ensuring their electromagnetic compatibility is also increasing.

The common wisdom, or stereotype description of this trend has been to call it 'exponential growth'. Nevertheless, without indulging into easy and risky forecasts, we can expect that this trend will continue. The European Communities Council Directive on electromagnetic compatibility recognizes this situation and will require from all interested parties a better understanding of the electromagnetic environment in which these electronic devices operate.

With that purpose in mind, this session gathers experts on both sides of the table: the authors who are bringing their contributions, and the participants who will focus on the subject during the session and take home the new ideas. This written record will serve as a reminder of our proceedings to the fortunate who participated, and at least serve as a valuable source of references to those who were unable to attend.

The first paper, by ***Dischinger, Koehler and Schaerly***, deals with the need for electromagnetic compatibility not only of general user's equipment, but also of the measuring equipment used to assess the electromagnetic environment at a specific location. Indeed, if this instrumentation were susceptible to disturbances, then how could we depend on the measurements results when prescribing realistic immunity levels or mitigation steps for the end-user equipment? By combining the measurements and computer modelling, the authors bring us added confidence in their conclusions, and important data on characterizing the harsh electromagnetic environment of high-voltage substations.

The second paper, by ***Richman***, addresses the issue of wearing out a test specimen through the process of immunity testing, an issue that is taking renewed importance as we witness the promulgation of more stressful test programs. Thus, it is important that we clearly understand the implications of these test programs on devices such as metal-oxide varistors that have an acknowledged limitation on the number of surges that can be applied. The purpose of a test program is to demonstrate equipment immunity, a process that can require the application of many more surges than what we can expect the equipment to encounter in its actual service life.

The third paper, by ***Standler***, presents a review of present knowledge on the occurrence of neutral-earth surge voltages. This paper is a welcome contribution to a subject where field data have been scarce, and controversies have erupted. The situation is made more difficult by the differences existing in the neutral-earth bonding practices among various countries. By turning to modeling of the branch circuit behavior as a transmission line, the author is able to demonstrate not only that surges do occur in the neutral-earth mode, but also that some of the current perceptions on their amplitude and frequency need to be revisited.

The fourth paper, by ***Richter, Schmidt and Tanner*** is a contribution to the growing realization that surge protection performed by cascading devices requires a coordinated approach. The concept of a descending staircase of overvoltages within a building, initially proposed by IEC 664, is about to be reconsidered by several technical committees of the IEC. In their paper, the authors address primarily the electromagnetic pulse threat. The concept of a coordinated approach based on a diversity of complementary device performances, and the need to revisit some of the earlier assumptions, also applies to the broad range of surge waveforms occurring in the electromagnetic environment.

The fifth paper, by ***Brocke, Goehlsch, and Noack***, is a timely contribution to the growing body of data on computer modelling of complex surge-protective devices, used as a single protection or, once again, in a multi-step scheme. The authors present several models for computing the behavior of varistors over their dynamic range, as well as the behavior of the fast gaps that may be used in conjunction with other nonlinear devices. They call attention to the issues of parallel connection and energy sharing, and point out the side effects of the action of a gap on the protected equipment, on the gap itself, and on the power system involved in the surge event.

The sixth paper, by ***Martzloff and Samotyj***, might be seen as a transition between the subjects of power-line and data-line transient protection. In fact, the purpose of the paper is to call attention to a situation that is only beginning to receive appropriate consideration. For multi-port electronic devices, transients occurring in power lines can no longer be treated separately from transients occurring in data lines and vice-versa. The term coordinated protection, used in discussing the previous papers where multiple devices are applied on the power port, takes on the different meaning of coordination between two different ports, the power port and the communications port.

The seventh paper, by ***Wolf, Plath and ter Haseborg***, brings the session to a shift from power line considerations to the domain of RF signals. By computations and measurements, the authors show the dilemma of connecting nonlinear devices for protection of the signal-processing equipment against transients, while avoiding the degradation of the normal signal by the secondary effects of other operating regions of a diode. The challenge is even greater in high frequency circuits, compared to the case of power line protection where the normal 'signal' is the low-frequency power supply, far away from the transients in the electromagnetic spectrum.

Thus, this session will take you along a non-random walk in the domain of power line and data line transients. It is interesting to note that all these independent contributions can nevertheless be linked by shared concerns on better understanding of the basic electromagnetic threat — the environment — as well as the behavior of the devices proposed to mitigate this threat. In conclusion then, on behalf of the Symposium organizers and especially those involved in this session, we thank the authors for their contributions as well as the participants for their discussions, and look forward to a very stimulating experience.