



Development of Statistically Enhanced Theoretical (SETH) Models: Application to Electronic Packaging



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The difficulty of creating analytical models to predict the response of an engineering system often inhibits the engineering practitioner from the attempt to develop such a model. However, closed-form equations for predictive modeling are very important for rapid prototyping of virtual models and for understanding how individual factors combine to influence a given response.

This talk will demonstrate and explain a methodology for enhancing the accuracy of analytical models. First, a robust theoretical model is constructed based on physical principles. Then, this model is enhanced with a carefully constructed statistical model, which derives information from experimental outcomes.

The prediction of the vertical deflection (warpage) of microelectronic Ball Grid Array (BGA) packages due to thermo-mechanical loads is used to illustrate and validate this concept. The results of the statistically enhanced theoretical (SETH) model for warpage prediction are found to be approximately 10 times more accurate than current physics-based models. Without statistical enhancement, the significant improvement in predictive accuracy probably could not have been achieved. Lastly, the general nature of SETH model development is explained as a practical methodology for application to many other areas of engineering endeavor.

Mr. Egan is currently a PhD candidate with the National University of Ireland in Cork. He graduated with a BS in Mechanical Engineering from The Pennsylvania State University and an MS from Carnegie Mellon University. He is a member of ASME, IEEE, and IMAPS and has served as a reviewer for IEEE Trans. on Components and Packaging Technologies.

Place:	Westinghouse Energy Center, Monroeville
Date:	July 14 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 John Momyer at (724) 864-6777 or john.momyer@crispcontrol.com by July 7th.

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.

2004 PES Outstanding Chapter Engineer Award

The power Engineering Society of IEEE Pittsburgh Section seeks nominations from local PES members for 2004 **PES Outstanding Chapter Engineer Award**. The nominees will be judged based on their activities during the past two calendar years (2002 and 2003) in the following categories.

1. Number of awarded patents (one point for each; maximum 5 points)
2. Number of IEEE publications (one point for each; maximum 5 points)
3. Number of IEEE related presentations (one point for each; maximum 5 points)
4. IEEE PES Chapter member/officer/volunteer (one point for each; maximum 5 points)

Interested members may submit their nominations outlining the above points to the Committee Chair Harry Hagerty at hhagerty@ieee.org no later than August 31st. The decision of the Award Committee will be considered final. The winner will be recognized at a PES function later in the year.



Automating Repetitive Calculations for Engineering Applications

Ray Valentine, P.E.



In applications, certain calculations are made for every new job. Many times the calculations are done repeatedly to consider different operating conditions or configurations. Further, many of the jobs to be done are similar, requiring the same kind of analyses time after time. Prior to the time when all engineers had computers to do the calculations, a slide-rule or a calculator was used. All the work was done manually on paper taking a fair amount of time and sometimes with arithmetic errors. Experienced engineers developed rules of thumb that gave them confidence about the solution, but they also had to subsequently organize data to produce documentation for the record. Now, with essentially every engineer having a computer to work with, there are ways to use the computer to do the repetitious calculations, without arithmetic errors, and in a form acceptable for documentation. There are a few different computer approaches one might take. On most computers, with almost no additional investment or training, spreadsheet programs can be written. Or, one can either buy a commercially available program or one can learn a programming language and write the code for their own solution. This talk is about learning and using a version of BASIC to fashion a computer tool to perform repetitive calculations and to produce an output form that can be used for documentation.

Mr. Valentine is retired from Westinghouse and has been active in IAS in the Industrial & Commercial Power Systems Department, Power Systems Protection Committee and in Pittsburgh Section IEEE since retirement. He is presently Chairman, Chapter 3 "Rating and Testing" of the IEEE Blue Book, IEEE Std 1015 titled "IEEE Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems".

Place:	Westinghouse Energy Center, Monroeville
Date:	July 21 st
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 Charles Baker at (412) 374-5425 or bakercf@westinghouse.com by July 14.

Directions: For directions, please refer to the article on the 1st page of The Bulletin.

IEEE International Symposium on Electrical Insulation September 19th through 22nd Indiana Convention Center Indianapolis, IN

The 2004 IEEE International Symposium on Electrical Insulation (ISEI 2004) conference is directed toward those who develop, test or use electrical insulation in electrical equipment. In the technical program, 140 papers from 31 countries will be presented. These papers will focus on the practical issues that are of a concern to those who work with transformers, rotating machines, cables, outdoor equipment and switchgear. Attendees will find answers to questions on what new insulation materials are available, as well as what new developments are being made in diagnostic testing and life extension. Poster sessions will be held on two evenings of the conference to address both practical application issues and research into new materials and test methods.

Shorts courses have been scheduled during ISEI 2004 that will provide basic information on a wide range of topics that will be useful to those new to the field, or who may need a better understanding of new materials and diagnostic techniques available.

Attendees will also have the opportunity to see the latest in electrical insulating materials, products and test equipment at the Engineering Manufacturing Expo 04 (EME 04). This Expo is located at the same facility as the ISEI 2004.

A number of working groups developing or revising IEEE standards related to electrical insulation as applied to rotating machines will also meet during the ISEI 2004. Attendees are welcome to attend.

Early registration is available through August 19th. For more information, or to register online, please visit www.deis.nrc.ca/isei2004.htm. IEEE members receive a discounted registration fee.

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