Material Identification of Solder Joint in Microelectronics Package Using Bayesian Approach

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Abstract

In this study, a method of computer model calibration, which was proposed by Kennedy & O'Hagan 2001, is applied to quantify the uncertainty arising in the inverse material identification of the solder joint in the microelectronics package subject to a thermal cycle based on the Bayesian framework. A mathematical example is considered to illustrate the concept and the procedure of the calibration approach. A Wire Bonded – Plastic Ball Grid Array (WB-PBGA) package is considered to determine the unknown properties of the solder joint, which exhibits nonlinear deformation under a thermal cycle. (Joo et al., 2005) Finite element model and Moire interferometry are employed to simulate and measure the deformation behavior respectively. Gaussian process model, also known as Kriging, is employed to approximate the original FEA model due to the costly computation. Posterior distribution function of the unknown parameters is formulated from the joint computer and experimental output data. Markov Chain Monte Carlo (MCMC) method is employed to simulate the distribution. (Andrieu et al, 2003) As a result, prediction of true deformation behavior is estimated in the form of probability distribution, which represents a measure of belief based on the obtained computer and experimental output.

References

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