Prediction of Impact Resistance of Polymeric Films Based on a Nonlinear Viscoelastic Model Using Finite Element Methods

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The goal of this work was the development of a finite element model that would allow the prediction of the behavior of polymeric coatings during stone impact as experienced by automotive coatings under road conditions. This report describes the physical model, the mathematical model, and the measurement of fundamental parameters by tensile testing and dynamic mechanical testing that are used to populate the constituitive equation. This work describes experiments carried out to validate the model and points to uses of the model to develop new polymer compositions and architectures that will have improved impact behavior.