



Verification for the Real ESSI Simulator

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Abstract

Accurate numerical modelling and simulation relies heavily on Verification and Validation (V&V) (Oberkampf et al 2002). V&V are the primary means of assessing accuracy in modelling and computational simulations, and are used to build confidence and credibility in numerical predictions. Verification is a process of determining that a model implementation accurately represents the developer's conceptual description and specification. It is essentially a mathematics issue and it provides evidence that the model is solved correctly. Validation on the other hand is the process of determining the degree to which a model is accurate representation of the real world from the perspective of the intended uses of the model. It is a physics issue, and provides evidence that the correct model is solved.

Presented in this paper is a verification suite for the Real ESSI Simulator. Real ESSI simulator is a computer system developed for realistic modelling and simulation of Earthquake-Soil-Structure Interaction (ESSI) for Nuclear Facilities. Verification for the Real ESSI covers all the finite elements, constitutive integration, solution advancement algorithms for both static and dynamic modelling, as well as dynamic wave propagation in dry (single phase) and saturated (two phase) medium. Parametric studies are used to verify modelling and simulation, as well to document errors in numerical modelling. Examples are used to illustrate Real ESSI verification suite. Examples will also be used to illustrate possible problems and inaccuracies in simulation results if verification is not performed.