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The European network SPICE code validation

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The Southern California Earthquake Center (SCEC) organized the 3D Numerical Simulation Code Validation Project for wave propagation in the past years. Recently, SCEC organizes an earthquake source physics code validation/comparison exercise. The goal of both efforts is to validate 3D earthquake simulation methods and foster their application by engineering community. One set of computational models includes simple models of a homogeneous halfspace and layer over halfspace, as well as complex model of the San Fernando Valley / Los Angeles Basin region. The earthquake source validation set will similarly cover models starting from relatively simple ones up to complex real events.

Development of the earthquake motion numerical simulation methods is one of the primary goals of the Seismic Wave Propagation and Imaging in Complex Media: a European Network (SPICE), the EU FP6 project. SPICE provides a reasonable platform for a code validation effort in Europe. We present a proposal of the SPICE Code Validation. The intention is to create a long-term basis for possible tests/comparisons/validation of numerical methods and codes for the earthquake motion simulation. The basis should serve even after the SPICE project is completed. The wave propagation subsets of models include a) simplest canonical models designed to test accuracy of the methods with respect to individual factors/features of the models including absorbing boundary conditions, b) canonical models combining two or more basic structural features, and c) realistic models. The source dynamics subsets of models are organized in a similar way. The models should account for different configurations of (visco)elastic parameters, friction laws, initial stress, nucleation and fault geometries. The model sets should reflect the recent development of the numerical methods as well as anticipated progress in a near future. Therefore,

the plan also includes models for which reference solutions are not yet available and whose computational parameters will be specified in correspondence with the methodology development. Technically, the code validation process will be facilitated using the web-based interface (http://www.nuquake.sk/SPICECVal/). The submitted solutions will be evaluated and compared using quantitative misfit criteria based on the time-frequency representation of the signals.