

Abstract Submitted
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A Dissipative Particle Dynamics Model of Fracture¹ DA GAO, PAUL MEAKIN, Center for Advanced Modeling and Simulation, Idaho National Laboratory, Idaho Falls, ID 83415 — The role of thermal fluctuations and dissipative physical processes in fracture initiation and propagation has not been systematically studied due to the absence of appropriate simulation models. In order to investigate this issue, we have developed a dissipative particle dynamics (DPD) model, in which the elastic interactions between adjacent nodes in a two-dimensional spring network model are supplemented by dissipative interactions and random forces related through the fluctuation-dissipation theorem. With this newly developed model, we have simulated two different scenarios: One is self-initiated spontaneous fracturing, and the other is externally forced fracturing. Our preliminary results show that the fluctuating and dissipative forces have an important influence on the propagation mode, and propagation path. Both qualitative analysis and quantitative results will be presented and discussed.

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