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**Modeling of Wormhole Growth in Porous Media Using the Material Point Method (MPM)** BALAJI JAYARAMAN, DUAN ZHANG, Los Alamos National Laboratory, BRIAN VANDERHEYDEN, BP Exploration and Production Technology — Modeling of wormhole growth in porous media such as a sand bed has been a subject of significant interest to the petroleum geological modeling and allied research communities. The challenge of simulating such problems, in spite of advances in computing resources and numerical methods, arise from the limitations in the algorithmic framework that can handle a whole range of problems such as moving boundary, large deformation and large separation in timescales. Here, we use the MPM, which combines mesh and particle capabilities for modeling solids and is extended to model generic multi-material interaction using continuous multiphase flow theory without the need for separate interface tracking and contact algorithms. This multiphase flow approach using an ensemble phase averaging method is often more convenient in dealing with problems of fluid-structure interaction where the material interaction is represented by coupling model terms in the mixed cells. The fluid and the sand bed are considered as two different phases (materials) having their own constitutive relations. Further, we use the material points to represent the solid sand particles to accurately capture its transport by the fluid medium. To handle the widely separated time scales in the problem we use sub-cycling to resolve the various physical processes.

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