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Hydrodynamic driven dissolution in porous media with fluid-filled cavities MOJDEH RASOULZADEH, WYATT KUEHSTER, University of Alabama — Hydrodynamics is a key player in defining the dissolution rate and dissolution hotspots in porous media with complex pore structure including embedded cavities. Cavities rearrange the pressure and flow field locally and affect the dissolution. On the cavity boundary, the fluid velocity maintains the concentration gradient and provides a fresh source of the solvent that facilitates dissolution. Given the characteristics of cavity and the porous zone, vorticities may form, and the cavity may partially or fully participate in the overall flow. In order to predict the dissolution hotspots properly, it is crucial to define the flow field accurately. We use the analytical models of flow in a porous medium including a random distribution of fluid-filled cavities. Darcy's law is coupled to the Stokes flow for spheroidal shaped cavities. On the cavity boundary, a no-jump condition on normal velocities, jump on pressures, and the generalized Beavers-Joseph-Saffman condition on tangential velocities is applied. A sequential non-iterative approach is applied to handle the coupling between hydrodynamics and dissolution. Transport of solute provides the concentration of solute at every grid point then the dissolved minerals is updated by PHREEQC. Dissolution hotspots are detected.

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