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Evaporation and Settling in an Idealized Porous Medium[1]
DANIEL ANDERSON, MATTHEW GERHART, George Mason University — We investigate a mathematical model of a periodic array of solid blocks supported by squeeze films and separated by vertical fluid-filled channels. Evaporation occurs at the open fluid surface at the top of the vertical channels between the blocks and is coupled to the motion of the blocks through mass conservation and pressure, viscous, surface tension and external forces on the blocks. We derive a simplified mathematical model in the form of coupled ordinary differential equations for the thickness of the squeeze film layer, the height of the fluid in the vertical channels and the contact angle at the free surface. We present numerical solutions of this model that address the coupling between block motion and height of the fluid in the channel in an effort to understand the question of channel dry-out versus wetting and fluid resupply via the underlying squeeze film.

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