

Reactive-infiltration instabilities in rocks. Fracture dissolution

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A reactive fluid dissolving the surface of a uniform fracture will trigger an instability in the dissolution front, leading to spontaneous formation of pronounced well-spaced channels in the surrounding rock matrix. Although the underlying mechanism is similar to the wormhole instability in porous rocks there are significant differences in the physics, due to the absence of a steadily propagating reaction front. In previous work we have described the geophysical implications of this instability in regard to the formation of long conduits in soluble rocks. Here we describe a more general linear stability analysis, including axial diffusion, transport limited dissolution, non-linear kinetics, and a finite length system.

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