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Flow induced instability of fluid flowing through an elastic crack

SHREYAS MANDRE, NEIL BALMFORTH, ALISON RUST, University of British Columbia — Fluid-structure interaction has received a lot of attention from engineers and scientists alike due to its practical significance. In this talk, we will present analysis of a specific example of such an interaction; that of flow through a narrow crack in an elastic material. This study was motivated by its potential application to a kind of seismic signal recorded by geologists called volcanic tremor. This tremor is believed to be caused by magma or magmatic fluids flowing through narrow channels in rocks. In the analysis the elastic material is assumed to be very stiff so that the mathematical model can be thought of as a perturbation of having a rigid wall. However, rather than looking at how the fluid modes are perturbed in the presence of a stiff wall, we concentrated on how the flow modifies the elastic oscillations of the surrounding medium. Towards the end we will discuss the results and their geological relevance.

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