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# Evolution of boudin geometry and boudin interaction

T. Bjørk and D.W. Schmid

Physics of Geological Processes, University of Oslo, Oslo, Norway

Boudins show a range of different geometries, from concave "fish mouth" structures to convex shaped ends. Employing a systematic numerical analysis we exploit the distinct geometries of boudins to infer effective viscosity contrast between boudin and host rock, initial gap ratio between boudins, and show what stress levels are required to drive the shape development. We assume an initial rupture stage were precipitated minerals fill the entire gap between the boudins. But in order to simplify the true visco-elasto-plastic material behaviour that governs the total boudin development we focus on the post-rupture stage and assume that this can be described by a power-law rheology. The numerical model employed is a two-dimensional finite element model that allows for continuous remeshing and therefore has no bounds on achievable strains. We do not assume an isolated boudin, but study the interaction effects between neighbouring boudins. We use a setup with three separated boudins with different aspect ratio, which undergoes simple shear deformation with gap ratios (gap width/height of boudin) ranging from 0.1 to 2.0. We compare the results from boudins with different viscosity contrast, both Newtonian and power law rheology.

The result of our systematic analysis is that we show how the actual aspect ratio and end-convexity/concavity depend on bulk strain, effective viscosity contrast, and initial gap ratio. Inverting this dataset allows to create lookup tables which can be used to decipher effective viscosity contrast and initial gap ratio from simple geometrical parameters that can be measured in the field.