# Exhumation between two rotating faults – small scale experiments for a large-scale phenomenon?

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The perturbation of initially planar markers around a single planar discontinuity was described by Passchier (2001) as a *flanking structure*. Many small-scale natural examples have already been presented in various studies and compared to numerical and analogue experiments in simple and general shear boundary conditions (e.g. Grasemann et al., 2003; Exner et al., 2004).

This new series of analogue experiments conducted in a ring shear apparatus considers the progressive deflection geometry of passive marker lines in the vicinity of a conjugate set of two planar slip surfaces embedded in a ductile matrix.

For a specific range of initial orientations of the two faults with respect to the shear zone boundary, progressive deformation and thus slip along the faults produces a normal fault geometry in the "hanging wall" and a reverse fault geometry in "footwall". Between the two faults, marker layers are "exhumed" with respect to the position of the corresponding layers in the far field. The resulting geometry is influenced not only by the offset of markers (induced by slip along the faults) and drag of markers (originating from perturbation strain), but also by the variable rotation rate of the fault surfaces. As the rate of rotation is faster for steeper orientations, the two faults converge, thus providing an additional mechanism of exhumation of material by extrusion in a narrowing channel.

It is important to note that (1) even in bulk simple shear boundary conditions, contractional and extensional structures develop simultaneously, (2) relatively large geometric effects are visible already at low total shear strains, and (3) the distribution of finite strain and kinematic vorticity within the matrix is very inhomogeneous.

Even though these simplistic analogue experiments do not account for gravity, rheological differences or non-simple shear boundary conditions, they may provide an important basis for understanding the exhumation of material between two conjugate faults also on a larger scale.

References:

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