Revisiting the factors which control the angle of shear bands in geodynamic numerical models of brittle deformation

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In this work I present Finite Element numerical simulations of brittle deformation in two-dimensional Cartesian systems subjected to compressional or extensional kinematical boundary conditions with a basal velocity discontinuity. The rheology is visco-plastic and is characterised by a cohesion and an angle of internal friction (Drucker-Prager type).

I will explore the influence of the following factors on the recovered shear band angles when the angle of internal friction is varied: a) element type (quadrilateral vs triangle), b) element order, c) continuous vs discontinous pressure, d) visco-plasticity model implementation, e) the nonlinear tolerance value, f) the use of markers, g) Picard vs Newton-Raphson, h) velocity discontinuity nature.

I will present these results in the light of already published literature (e.g. Lemiale et al, PEPI 171, 2008; Kaus, Tectonophysics 484, 2010).