

THE MODELING OF GEOLOGICAL MATERIALS FOR THE
NUMERICAL SIMULATION OF COLLISIONS OF CONTINENTAL
PLATES

– talk –

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The collision of the Indian sub-continent with Asia involves complex mechanisms of deformation: the creation and propagation of faults which accommodate the extrusion of continental blocks, the thickening of the crust of the Earth. Our goal is to develop a simplified numerical model that should account for the main phenomena that interact in such collisions [1]. In this model, the crust is considered to be a visco-elasto-plastic material in which cracks are allowed to propagate. This hypothesis is qualitatively supported by analogue experiments showing faults propagation in a layer of plasticine (Asian crust) deformed by a rigid indenter (Indian crust), which extrudes blocks away from the indenter path. The evolution of the medium is based on the minimisation of an energy that depends on the displacement, the elastic and plastic deformation and on a phase-field function that tracks the location and propagation of cracks. We prove the existence of solutions and the Clausius-Duhem inequality [2]. We describe the numerical method used to simulate indentation experiments in 2D and present numerical results.

REFERENCES

- [1] Lukas Jakabcin, *PhD Thesis, in preparation.*
- [2] Eric Bonnetier, Lukas Jakabcin, Stéphane Labbe, Anne Replumaz, *The Modeling of geological materials for the numerical simulation of collisions of continental plates, in preparation.*

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