A new brittle-elastoviscoplastic fluid based on the Drucker-Prager plasticity

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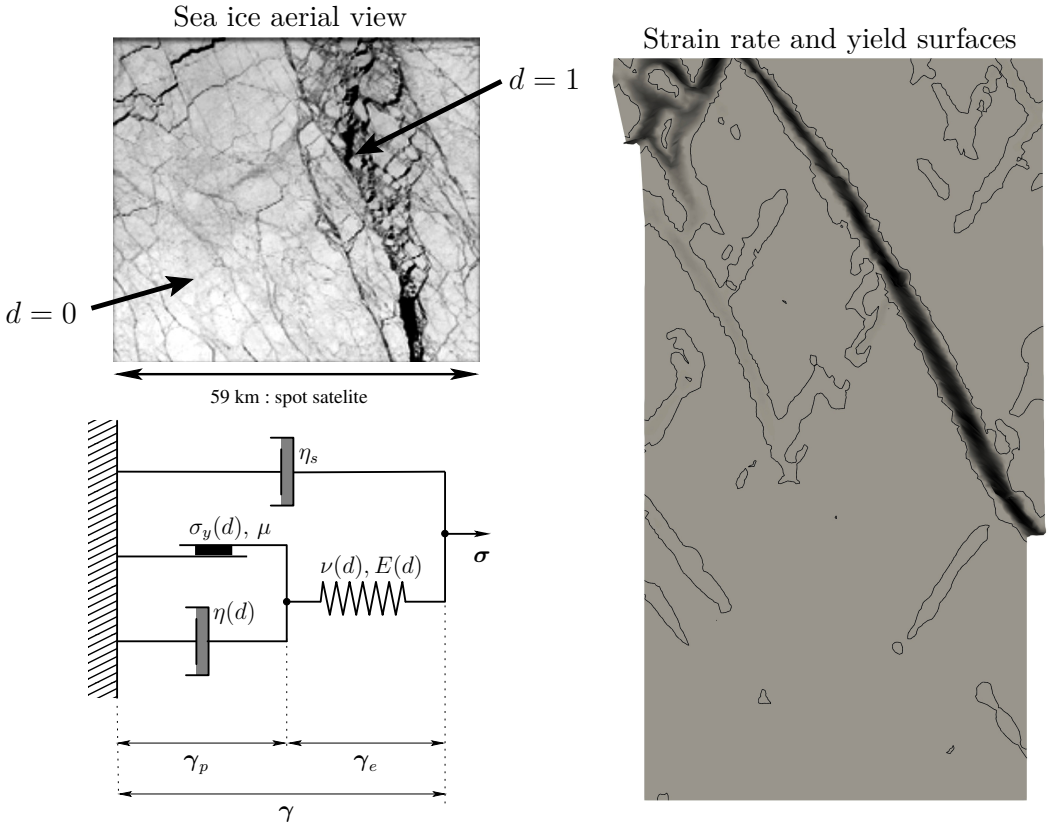

A new brittle-elastoviscoplastic (BEVP) fluid model is presented in this paper [1]. This model is relatively simple to use, as it contains few material parameters and a simple fixed-point algorithm is effective for solving the coupled system of equations. The model combines some existing fundamental features such as elasticity, plasticity and brittle damage. The combination of them is based on thermodynamics that ensures the positivity of the dissipation and the Onsager symmetry. Moreover, thermodynamics allows to point out the link between thixotropy and damage in the context of elastoviscoplastic (EVP) fluids. From convex analysis, new theoretical results on the Drucker-Prager plasticity criterion are also obtained in order to derive the viscoplastic dissipation potential. Preliminary results with the proposed BEVP model are very encouraging : it is able to represent the pre-failure, failure and post-failure behavior of quasi-brittle materials.

keywords – partial differential equations ; convex analysis ; finite element method ; thermodynamics ; elastoviscoplastic fluid ; damage.

Références

[1] P. Saramito. A new brittle-elastoviscoplastic fluid based on the Drucker-Prager plasticity. *J. Non-Newt. Fluid Mech.*, 294 :104584, 2021.

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