Numerical test of a mathematical model of rock glacier flow with temperature effects

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We present a numerical test of a mathematical model of rock glacier recently extended to include temperature effects. This is based on the general conservation laws (momentum, mass and energy) and describes velocity, pressure and temperature fields. It takes into account the effect of shear rate, pressure and volume fraction of the rocks and sand grains trapped within the interstices of the rock glacier onto viscosity, also by implementing the effects of local pressure melting point variation due to local normal stress differences. The test case considered is the Murtel-Corvatsch rock glacier where we compare with the measured displacement of a local borehole. In particular the impact of the temperature effects will be exhibited.

[1] Kannan, K., Rajagopal, K.R.: A model for the flow of rock glaciers. Int. J. Non-lin. Mech., 48, pp. 59–64 (2013)
[2] Kannan, K., Mansutti, D., Rajagopal, K.R. and Urbini, S.: Mathematical modeling of rock glacier flow with temperature effects, in Mathematical Approach to Climate Change and Impacts (P. Cannarsa, D. Mansutti and A. Provenzale, eds.), Springer-INDAM series (2018) (submitted)