Abstract Submitted
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Ill-posedness of Dynamic Equations of Compressible Granular Flow MICHAEL SHEARER, North Carolina State University, NICO GRAY, University of Manchester — We introduce models for 2-dimensional time-dependent compressible flow of granular materials and suspensions, based on the rheology of Pouliquen and Forterre. The models include density dependence through a constitutive equation in which the density or volume fraction of solid particles with material density ρ^* is taken as a function of an inertial number I: $\rho = \rho^*\Phi(\mathrm{I})$, in which $\Phi(\mathrm{I})$ is a decreasing function of I. This modelling has different implications from models relying on critical state soil mechanics, in which ρ is treated as a variable in the equations, contributing to a flow rule. The analysis of the system of equations builds on recent work of Barker et al in the incompressible case. The main result is the identification of a criterion for well-posedness of the equations. We additionally analyze a modification that applies to suspensions, for which the rheology takes a different form and the inertial number reflects the role of the fluid viscosity.

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