

Viscometric free surface flows

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Viscometric flows refer to a type of flow characterized by simple shear, elongational, or a combination of both, where the stress is proportional to the rate of strain. Rheometers always aim to produce consistently viscometric flow conditions to enable the repeatable and reliable characterisation of fluid samples under well-controlled conditions. Unfortunately, many situations occur when the rheological properties of a fluid need to be quantified but viscometric flow conditions cannot be achieved in practice. This paper investigates a number of volcanologically-relevant free surface flows which are not viscometric as they do not exhibit a uniform state of strain rate but are rheometric nonetheless as the combination of free surface measurements with careful mathematical modelling and numerical simulations still enables the inference of useful rheological information..