Flow Regime Boundaries

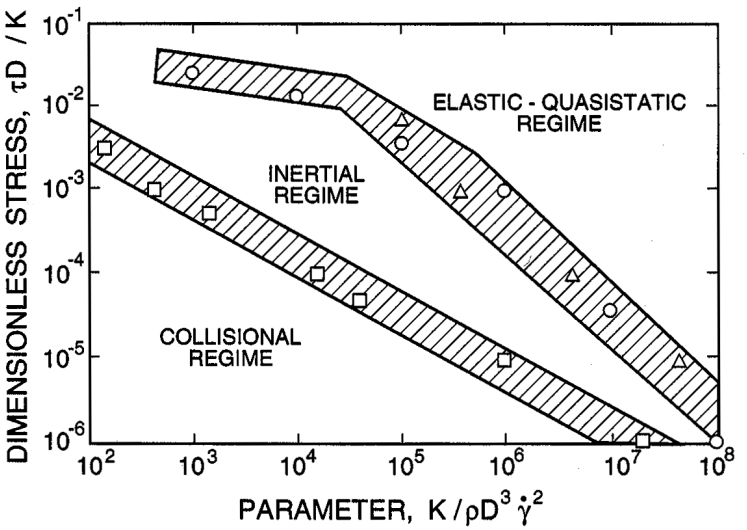

Figure 1: Typical flow regime map for uniform shear flow in a plot of the dimensionless overburden or normal stress against the parameter, $K/\rho_S D^3\dot{\gamma}^2$, as determined from the fixed normal stress computer simulations of Campbell (2003) (for the case of a friction coefficient of $\mu^* = 0.5$ and a coefficient of restitution of $\epsilon = 0.7$).

Figure 1 is a typical flow regime map as constructed by Campbell (2003) from computer-modeled rheological information. The regimes are indicated in a map of the overburden or dimensionless stress plotted against the parameter $K/\rho_S D^3\dot{\gamma}^2$ and the results show the progression at fixed overburden from the elastic-quasistatic regime at low shear rates to the inertial regime. Campbell also indicates that part of the inertial regime in which the flow is purely collisional (rapid granular flow). This occurs at low overburdens but at sufficiently high shear rates that rapid granular flows are uncommon in practice though they have been generated in a number of experimental shear cell devices.