Size and density segregation in bidisperse mixtures

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In recent years, quite a few mixture theory continuum models, e.g., Gray & Thornton (2005); Tunuguntla *et al.* (2014), have attempted to, qualitatively and quantitatively, predict particle segregation in bidisperse mixture flows over inclined channels. This ongoing continuum approach incorporates percolation-driven segregation phenomenon into a continuum transport equation given in terms of particle volume fraction of a particular species. The key feature behind these models lies upon the fact on how the total bulk pressure is distributed among the two particle species. Thereby, indicating the need for suitable pressure scalings which help us determine the proportion of the bulk pressure to be carried by each type of particle species.

To investigate this in detail, for bidisperse mixtures varying in size and density, we use fully three dimensional discrete particle simulations (DPMs) as used in Tunuguntla *et al.* (2014). With the available DPMs particle data, we project the discrete data onto a continuum field using the novel coarse graining technique (Weinhart *et al.* 2013; Tunuguntla *et al.* 2015). With the constructed macroscopic fields, such as the partial and bulk stresses, at hand we arrive at suitable pressure scalings taking into the effects of both particle size and density. Thence, providing us with DPMs validated pressure scalings required to predict particle segregation more accurately using continuum approach.

During this conference, we will present the results of our analysis, described above, concerning bidisperse flows over inclined channels varying both in size and density.

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