Abstract

Fluid-fluid interfaces play a dominant role in the behaviour of many industrial processes, in particular those that involve the coating (wetting) or separation (de-wetting) of particles and fluids. Examples of such processes include the extraction of bitumen from the tar sands, deposition of polymer and inorganic particles by inkjet printing, drug delivery from micro- and nano-capsules, the production of food such as ice cream, remediation of contaminated soil, microfluidic devices and the stabilization of foams and emulsions. An understanding of such phenomena requires understanding of the fundamental mechanics of particles at fluid-fluid interfaces on the smallest relevant scales.

Although an extensive body of literature exists focusing on experimental studies of such phenomena, the use of numerical methods has received comparatively little attention. One such promising approach is the use of a coupled Volume-of-Fluid (VoF) multiphase and Immersed Boundary (IB) solver. IBs offer an advantage over traditional body-fitted meshes in that fixed cartesian meshes can be used, even when multiple bodies are present. It is anticipated this advantage will become even more pronounced when multiple dynamic bodies are present. In this presentation, progress towards the development of a coupled VoF/IB solver with wetting dynamics will be discussed.