Authors’ Closure

The basic premise behind mixture theory is that the many constituents that form the mixture are distributed in a manner that, over the region occupied by the mixture and over a length of time, each of the constituents can be modeled as a continuum. Such an assumption is tacit, for instance, even in the modeling of, say, a single constituent gas. Mixture theory is not arrived by trying to generalize the flow of one constituent over a droplet of another. Mixture theory is based on a homogenization procedure. Thus, it can provide at best an averaged picture of the flow of the constituents. To obtain a more accurate picture of the flow characteristics of mixtures, one would have to employ statistical methods. But here, there is a need for statistical samples etc., and even the simplest of practical problems become intractable.

With regard to the specific questions that have been raised, namely whether inertial effects can be included and if concentration can be allowed to vary across the film, the answer is a simple yes. The theory allows for inertial effects to be included and the concentration can be allowed to vary across the film. We neglected inertial effects and assumed the concentration to be a constant across the film, for the sake of simplicity. Moreover, our results, which qualitatively agree with experiments seem to vindicate such assumptions. Of course, not making these assumptions might lead to a more accurate description of the problem.