Abstract Submitted
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Explicit numerical simulation of binary drop collision in a linear shear field at finite Reynolds numbers[1] MARK BIGGS, University of Edinburgh — In this presentation, we will report an immiscible lattice-gas automata based study of the collision of two initially spherical drops suspended in a second liquid subject to a one-dimensional linear shear field. Capillary numbers ranging from Ca = 0.06 to Ca = 0.8 were investigated for the Reynolds numbers Re = $5/2^n$ for $n = 0, \ldots, 4$. A range of collision scenarios were observed ranging from coalescence in the compressional and extensional quadrants both with and without secondary drop formation, to collisions we term 'kiss-and-break' in which the drops coalesce before separating again to form two or more drops, and non-coalescence. Limited results suggest that the regions of the parameter space associated with the various collision scenarios are not separated by distinct boundaries but, rather, transition zones in which the probabilities of the two outcomes vary in a complementary fashion from one to the other. The critical Capillary number is a strong function of the Reynolds number up to Re = 1.25 where it becomes largely independent of the Reynolds number. The nature of the variation of the 'film thickness' during collisions is a function of both Capillary and Reynolds numbers. The dimensionless 'film drainage time' increases with Capillary number and decreases as the Reynolds number increases to Re = 2.5 where it ceases to change with Re.

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