Abstract Submitted
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Coalescence of liquid drops without singularities STEPHEN DECENT, University of Birmingham — It is now known that the usual equations for an incompressible viscous free-surface flow (conservation of mass, Navier-Stokes, normal and tangential stress boundary conditions, kinematic condition) give rise to a singularity when the equations are used to model the coalescence of two or more liquid drops in a gas if the surface tension of the free-surfaces is assumed to be constant. This singularity arises at the location and moment of impact of the liquid free-surfaces. This singularity will cause the solution to be unrealistic very close to the impact point and at times very soon after the moment of impact. Allowing the surface tension to be dynamic removes this unphysical singularity (Shikhmurzaev, Physics of Fluids, vol. 12, 2386-2396; October 2000). New computational results demonstrate the removal of the singularity from the model's solution and show how the flow close to the impact point is altered by dynamic surface tension. The results are discussed in the context of coalescing micron sized drops where these new effects are thought to be particularly important.

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