VOF-Based Height Function Method for 3D Calculation of Contact Line Phenomena SHAHRIAR AFKHAMI, Virginia Tech — A rigorous methodology is presented for applying a contact angle as a contact line boundary condition within a 3D VOF-based flow algorithm. Based on the recently-developed height function methodology, an approach for modeling contact lines is presented that yields accurate interface normals and curvatures from volume fractions and allows the rigorous representation of surface tension forces at contact lines, values that converge with spatial refinement. Although VOF methods have been used before to model phenomena that includes contact lines, the implementation details have rarely been presented. Here a detailed implementation is presented, that includes algorithms for identifying so-called "contact line" and "adjacent" cells, as well as for calculating normals and curvatures in these cells. The efficacy of this approach is demonstrated via examples of both static and dynamic contact line phenomena. The model is shown to accurately predict steady state configurations defined by the imposed contact angles, from initial conditions far from equilibrium.

Shahriar Afkhami
Virginia Tech

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