Improved connectivity free front tracking method for modeling contact lines in multiphase flow CHU WANG, LUCY ZHANG, Rensselaer Polytechnic Institute — A numerical algorithm is developed to simulate multiphase flows with contact lines by coupling dynamic contact line model into the connectivity free front tracking method (CFFT). The contact angle is specified dynamically with an empirical correlation related to the contact line velocity. The hysteresis of the contact angles is also included in the algorithm. This contact line model is coupled to the CFFT conveniently for its explicit representation of the interface. Also, the CFFT does not require the connectivity of the interfacial points to construct the indicator field by ensuring a constant indicator, e.g. I=0.5 coinciding with interface. The topology change of the interface including the contact lines can be treated automatically by adopting a simple points-regeneration scheme. RKPM interpolations are used to achieve better accuracy when constructing the indicator and calculating the normal for contact lines where the interfacial points are connected to the solid wall. Several test cases are performed to validate the method to show its accuracy and capability to simulate multiphase flows with contact lines that undergo frequent topology changes.

Chu Wang
Rensselaer Polytechnic Institute