

Eulerian-Particle Finite Element Method Model for Transient Capillary Forces of a Moving Contact Line

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Abstract : An embedded particle finite element model has been developed to simulate the transient capillary forces acting on a moving contact line of spreading liquid drop on a smooth solid surface. Three common dissipative force models were tested numerically to account for the capillary effect at the solid-liquid interface. Among those models, Jiang's model was found to be the most stable one. Our proposed numerical model was validated experimentally for a wide variety of surface wettability. A dimensionless relationship between the spreading rate and time was established, and the results showed good agreement with the experimental data.

Keywords : PFEM-embedded, Eulerian-PFEM, surface tension, capillary forces, moving contact line, non-dimensional analysis

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