# NUMERICAL SIMULATION OF FREE BOUNDARY VISCOUS FLOWS AT ALL LENGTH SCALES OF LCM PROCESS

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Numerical simulation aspects related to low Reynolds number free boundary viscous flows at micro, meso and macrolevel during the resin impregnation stage of the Liquid Composite Molding (LCM) Process are studied. Free boundary program (FBP), developed by the authors is used to track the movement of the resin front accurately by accounting for the surface tension effects at the boundary. FBP encompasses a set of subroutines that are linked to modules in ANSYS and has full capability of capturing the void formation dynamics. Issues related to the global and local mass conservation (GMC and LMC) are identified and discussed. Unsuitable conditions for LMC and consequently GMC are uncovered at low capillary number. Detailed discussion is devoted to the kinematic free boundary condition and progression of the free boundary according to the frontal velocities. Possible differences related to the free boundary patterns of such cases are shown.