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FOUNTAIN FLOW EFFECT ON FIBER MATRIX SEPARATION DURING MANUFACTURING OF SHORT FIBER FILLED INJECTION PARTS

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Mold filling of fiber reinforced resins plays a significant role on part quality. This is reflected in the form of fiber attrition, excessive fiber orientation, fiber jamming and fiber matrix separation during manufacturing of short fiber filled plastic composite parts. Of particular importance is the fountain flow effect that may significantly affect the fiber distribution in the injection and compression molding. This paper shows how fountain flow together with fiber-matrix separation can lead to a fiber-free region on the outer surfaces of an injection molded product. The flow simulations use the novel radial basis function technique, and are coupled with mechanistic simulations that describe the motion, deformation and interaction of fibers within the resin. The mechanistic fiber model describes the fibers with a series of beads and springs and includes elastic, excluded volume, stokes and frictional forces.