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3D SIMULATION AND EXPERIMENTAL STUDY IN DETERMINING RHEOLOGICAL PROPERTIES FOR HIGH SPEED INJECTION MOLDING PROCESS

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Today's injection molding machine manufacturers are experiencing increasing demand for small and thin walled parts for high speed molding technology from the electronics and automotive markets. With the use of high speed injection molding process, the shear strain rates up to 1x105 s?1 or more may be involved. Due to the lack of appropriate experimental equipment and simulation method, the investigations of the micro-scale rheology become very difficult. In this study, we focus on the polymer melt rheological properties of high-speed injection molding and the melt flow characteristics of small size-depth are discussed through simulation and experiment systematically. The slit flow model is adapted to obtain the viscosity model parameters for simulation of high shear rate region. By using these adjusted numerical values for second Newton area, the simulation results show a good agreement with the experimental data. Moreover, microscopic scale melt rheology such as viscous heating and wall slip effect are also studied numerically. The results illustrate the potential approach for further process simulation and mold design of high speed injection molding process.