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Anisotropic Thermal Conduction in Injection Molding

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In non-isothermal processing of fiber-filled polymers, the flow-induced orientation of polymer chains and fibers can result in anisotropic thermal conductivity, which in turn affects the processability and the end-use properties of the polymer. This paper discusses modeling methods for prediction of the anisotropic thermal conductivity and shows that in injection molding, the effects of molecular orientation and fiber orientation can cause 20 ~ 30% reduction of the thermal conductivity in the gap-wise direction of the mold cavity. We discuss changes in simulation results due to this reduction in thermal conductivity.