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Method to account for the fiber orientation of the initial charge on the fiber orientation of finished part in compression molding simulation

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Abstract

In the automotive industry, interest in compression molding of discontinuous fiber reinforced thermoplastic is rapidly increasing. Compression molding offers fast cycle times, allowing us to maintain longer fibers. Longer fibers translate into improved mechanical properties, and hence, lighter parts. The mechanical properties of such components also largely depend on the fiber orientation. It has been observed that the fiber orientation in the finished part depends on the initial fiber orientation of the bulk charge being compressed. In this paper, we present methods to measure initial fiber orientation in the bulk charge and demonstrate how it can be included in the simulation. Computer tomography is used to scan the bulk charge to estimate the orientation of the fibers in the charge. The estimated orientation through the charge is mapped as the initial condition for the charge used in the compression molding simulation. We also demonstrate the improvement in the predicted fiber orientation resulting from the proposed approach with a physical example.

Keywords: *Initial fiber orientation, Compression molding, Mapping*

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