

Fiber Orientation Measurements in Reinforced Thermoplastics

Authors : Ihsane Modhaffar

Abstract : Fiber orientation is essential for the physical properties of composite materials. The theoretical parameters of a given reinforcement are usually known and widely used to predict the behavior of the material. In this work, we propose an image processing approach to estimate true principal directions and fiber orientation during injection molding processes of short fiber reinforced thermoplastics. Generally, a group of fibers are described in terms of probability distribution function or orientation tensor. Numerical techniques for the prediction of fiber orientation are also considered for concentrated situations. The flow was considered to be incompressible, and behave as Newtonian fluid containing suspensions of short-fibers. The governing equations, of this problem are: the continuity, the momentum and the energy. The obtained results were compared to available experimental findings. A good agreement between the numerical results and the experimental data was achieved.

Keywords : injection, composites, short-fiber reinforced thermoplastics, fiber orientation, incompressible fluid, numerical simulation

Conference Title : ICMME 2014 : International Conference on Mechanical and Materials Engineering

Conference Location : Paris, France

Conference Dates : October 30-31, 2014