

Abstract

Liquid Composite Molding (LCM) processes are cost efficient manufacturing alternatives to traditional autoclave technology for producing near-net shape structural composite parts. However, process induced defects often limit wider usage of LCM in structural applications. Thorough knowledge of these defects, as well as their formation mechanisms and prevention techniques, is essential in developing improved LCM processes. In this article, process induced defects in liquid molding processes of composites, categorized into preform, flow induced and cure induced defects, are reviewed. Preform defects are further presented as fiber misalignment and fiber undulation (waviness and wrinkling). The respective causes, detrimental effects, and possible prevention methods of these defects are presented. Thereafter, flow induced defects are classified as voids and dry spots. Dry spot formation mechanisms in LCM processes and available prevention techniques are summarized. In addition, void formation mechanisms, adverse effects on composite properties, and removal techniques are presented. Cure induced defects include microcracks, void growth and geometrical distortions (warping and spring-in). Each of these defects are discussed along with their underlying causes as well as their control and reduction schemes.