Analysis of the Deformation Behavior of Multilayer Film in a Transverse Stretching Process with a Tenter

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In recent years, plastic films are used for wide fields, such as packaging materials and optical applications, etc. Since the need for high-performance films becomes still stronger, it is necessary to impart high functionality to films. A multilayer film composed of two or more polymers has been developed in order to achieve the higher function of film. Though the thickness uniformity of film is a very important property, attempts to predict the thickness uniformity in the manufacturing process of film have been limited to monolayer films and are little-known to multilayer films. Generally, flat films are made by a successive stretching method composed of a longitudinal stretching process by the difference in speed between rolls and a transverse stretching process with a tenter. This work is attempted to simulate the deformation behavior of multilayer film in a tenter with an FEM. The problem that the polymer characteristics of each layer composing a multilayer film are different respectively, causes difficulties to simulate the deformation behavior such as the thickness distribution of film in a tenter. In this work, a new simulation model proposed on the prediction of thickness distribution of multilayer film in a tenter. It is confirmed that the proposed model can predict the deformation behavior of multilayer film in a tenter judging from the fact that the predicted thickness distribution by computer simulation is in good agreement with experimental ones obtained from a pilot plant.