

## Uniformity of thermoplastic unidirectional carbon fiber (UD-CF) prepreg

Ngo Ich Son, 임영일<sup>†</sup>, 한문희<sup>1</sup>, 정재호<sup>1</sup>  
환경대학교; <sup>1</sup>효성기술원  
(limyi@hknu.ac.kr<sup>†</sup>)

A computational fluid dynamics (CFD) model with real geometry of a pultrusion process was proposed for unidirectional carbon fiber (UD-CF) prepreg production. The polyamine 6 (PA6) and polyacrylonitrile-based CF were used as the thermoplastic polymer matrix and reinforcement, respectively. The non-Newtonian viscosity of PA6 was expressed as the Carreau's model. The tow domain was treated as a porous media with anisotropic viscous resistances in moving frame reference coordinate. The thermoplastic resin injected from the bottom was impregnated into the CF tow. The resin velocity profile obtained from the CFD showed a similar tendency to the relative resin amount experimentally measured for ten segments of UD-CF prepreg. The uniformity index of the resin velocity ( $UI_v$ ) on the outlet surface was calculated for several tow speeds and resin flow rates. The tow speed showing a maximum  $UI_v$  had a linear relation with the slip velocity.