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Title: Multi-scale computational fluid dynamics of impregnation die for thermoplastic carbon fiber prepreg production

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1 **Multi-scale computational fluid dynamics of impregnation die for thermoplastic carbon**  
2 **fiber prepreg production**

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13 **Highlights**

- 14 - A multi-scale CFD model was developed for a carbon fiber (CF) impregnation process.  
15 - Resin permeability to CF filaments was obtained from a micro-scale CFD model.  
16 - Uniformity index (*UI*) of the resin velocity was obtained from a macro-scale CFD model.  
17 - Tow speed showing maximum *UI* was expressed as a linear function of the slip velocity.

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