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Magnetic alignment of short carbon fibres in curing composites

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Abstract

Alignment of magnetic particles into a viscous fluid by a homogeneous **magnetic** field has been studied both experimentally and theoretically, but very few studies have investigated the effects of viscosity changes on the capability of achieving complex fibre assemblies in composite materials. In this paper, we study the alignment of short carbon fibres into a viscous matrix whose viscosity is made dependent **on** the time, **in order** to simulate the curing process of the composite. A simple model is derived which gives the evolution of fibre position and orientation in terms of the external field and shows good agreement with the experimental evidence on nickel coated carbon fibres embedded in PDMS. The model is used to predict the fibre distribution at curing and hence could be a useful tool to predict the mechanical, electrical and magnetic properties of the composite. A closed form expression of the minimum magnetic field intensity necessary to achieve the

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