Linear Thermoelasticity of Short Fibre Reinforced Composites

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Lightweight structures became more and more important over the last years. One special class of such structures are short fibre reinforced composites, produced by injection moulding. To avoid expensive experiments for testing the mechanical behaviour of these composites proper material models are needed. Thereby, the stochastic nature of the fibre orientation is the main problem.

In this talk we will look onto the simulation of such materials in a linear thermoelastic setting. This means the material is described by the heat conduction tensor $\kappa(\mathbf{p})$, the thermal expansion tensor $\mathbf{T}(\mathbf{p})$, and the stiffness tensor $\mathfrak{C}(\mathbf{p})$. Due to the production process these occurring material quantities has to been understood as random variables.

The classical approach is to average these quantities and solve the linear thermoelastic deformation problem with the averaged expression. We will present a way how this approach can be extended to achieve better approximations of the solutions and will show some numerical results.

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