On aspects of thermomechanical homogenization with applications to C/C composites

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State-of-the-art composites like metal matrix composites or C/C-composites are typically subject to combined thermal and mechanical loading either during the production process itself or their lifetime. For the homogenization of the mechanical properties of such composites, several methods both numerically for obtaining bounds and estimates for effective material properties have been well established meanwhile [1, 2]. In this contribution, we study the homogenization of the thermal properties of the composites taking explicitly into account the thermomechanical interactions. Within the framework of linear thermoelasticity but without perturbation theory [3] we derive Hashin-Shtrikman bounds for the thermal expansion coefficient, the thermal conductivity and the specific heat capacity in a way similar to [4].

References