

1. Record Nr.	UNINA9910673915903321
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Titolo	Fiber orientation tensors and mean field homogenization : application to sheet molding compound // Julian Karl Bauer
Pubbl/distr/stampa	Karlsruhe, Germany : , : KIT Scientific Publishing, , 2023
Descrizione fisica	1 online resource (xi, 225 pages)
Disciplina	620.1923
Soggetti	Fiber-reinforced plastics - Testing Reinforced plastics - Testing
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Sommario/riassunto	Effective mechanical properties of fiber-reinforced composites strongly depend on the microstructure, including the fibers' orientation. Studying this dependency, we identify the variety of fiber orientation tensors up to fourth-order using irreducible tensors and material symmetry. The case of planar fiber orientation tensors, relevant for sheet molding compound, is presented completely. Consequences for the reconstruction of fiber distributions and mean field homogenization are presented.