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Homogenized Mechanical Behavior of Cross-Linked Fiber Networks Embedded in Matrix CATALIN PICU, LIJUAN ZHANG, ALI SHAH-SAVARI, Rensselaer Polytechnic Institute — Most biological and some biomimetic materials are made from fiber networks embedded in an elastic medium. The mechanical behavior of these composites depends in interesting ways on the elasticity of the matrix. In this work we study this issue using both 2D and 3D models, with the goal of deriving expressions linking microstructural parameters and the composite elastic properties. We show that the strong interaction between network and matrix precludes the use of linear superposition of effects and that the effective moduli are a complex function of the constituent moduli. The internal distribution of stresses is also studied and discussed in relation with failure mechanisms.

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