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NUMERICAL HOMOGENIZATION OF RANDOM MICRO-STRUCTURES FOR STRUCTURAL MECHANICS

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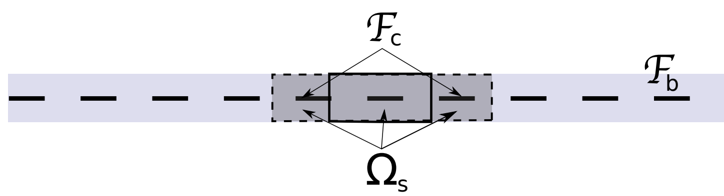

Figure 1: Coupling configuration for the homogenization problem: the beam model is present everywhere $\mathcal{F}_b \times \mathcal{S} = \Omega$, and the sample microstructure Ω_s is placed in the middle.

We describe a numerical homogenization method that yields the beam parameters corresponding to a homogenized stochastic solid model in a slender domain. This method is based on a novel volume coupling technique for random solid models and deterministic beam models [1, 2], in the Arlequin framework, that is also described in this paper. The homogenization technique allows to use beam models, that are more practical from a numerical point of view for many industrial applications, constrained by information obtained at the micro-structure level, where beam mechanics cannot be reasonably applied. Two similar approaches are explored, extending the classical Kinematical and Statical Uniform Boundary Conditions used in classical numerical homogenization and the differences in the identified parameters are discussed.

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