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Quantitative stochastic homogenization of variational models arising in fracture mechanics

Wednesday, June 26, 2024 11:00 AM (30 minutes)

I will present a recent quantitative result concerning the stochastic homogenization of the so-called Griffith type model arising in fracture mechanics : the energy $E_\varepsilon(u)$ for $u \in \mathrm{SBV}$ takes the form of $\mathrm{E}_\varepsilon(u) = \int_{\Omega\setminus S_u} F\left(\frac{\cdot}{\varepsilon}, \nabla u\right) - f\cdot u + \int_{S_u} g\left(\frac{\cdot}{\varepsilon}\right)\, \mathrm{d}\mathcal{H}^{d-1}, where \mathrm{F} denotes the stored elastic energy, f the external forces, g the toughness$ 1 the scale of the microstructure. Since the work of Cagnetti, Dal Maso, Scardia and Zeppieri, the homogenized model has been identified qualitatively by taking the Γ-limit as $\varepsilon \downarrow 0$ in the equation above; and in particular the two main constitutive properties of the system have been derived: the homogenized elastic energy and the homogenized fracture toughness, both given explicitly by means of cell-formulas. I will explain in this talk how we can derive quantitative estimates for the convergence of the cell-formula for the effective toughness. This is based on a joint work with Julian Fischer and Antonio Agresti.

Presenter: CLOZEAU, Nicolas (IST Austria)