The effect of the geometry of the domain on martensitic phase transformations

Antonio Tribuzio, University of Bonn

We study scaling laws for singular perturbation problems associated with a class of two-dimensional martensitic phase transformations for which we deduce a domain dependence of the scaling law in the singular perturbation parameter.
Firstly, we prove a general lower bound estimate illustrating that in settings in which the domain and well geometry are incompatible (in the sense of the Hadamard-jump condition) then necessarily at least logarithmic losses occur in the associated scaling laws.
Secondly, for specific phase transformation in two-dimensional settings we prove that this gives rise to a dichotomy involving logarithmic losses in the scaling law for generic domains and optimal linear scaling laws for very specific, highly compatible polygonal domains. We discuss both the geometrically linearized and nonlinear settings.
This is a joint work with Janusz Ginster, Angkana Rüland and Barbara Zwicknagl.