

Homogenization of Semi-linear Parabolic Problems in Thick Fractal Junctions

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A *thick junction* of type $m : k : d$ is the union of some domain, which is called the junction's body, and a lot of joined thin domains situated ε -periodically along some manifold, which is called the joint zone, on the boundary of the junction's body. The type $m : k : d$ refers to the limiting dimensions (as $\varepsilon \rightarrow 0$) of the junction's body, the joint zone and each of the attached thin domains. The small parameter ε characterizes distance between neighboring thin domains and their thickness. The aim of investigation of boundary-value problems in thick junctions is the asymptotic behavior of solutions as $\varepsilon \rightarrow 0$, i.e. when the number of joined thin domains infinitely increases and their thickness goes to zero.

Since various constructions of the thick junction type are successfully used in nanotechnologies and microtechnique, the extensive study of boundary-value problems in thick junctions with more complicated configurations are appeared in the last time (see for instance [1] - [4] and references therein).

In my report I am going to present new results for boundary-value problems in thick junctions that have fractal structure.

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- [2] T. Durante, T.A. Mel'nyk, Homogenization of quasilinear optimal control problems involving a thick multilevel junction of type $3 : 2 : 1$. *ESAIM: Control, Optimisation and Calculus of Variations*, **18** (2012), no. 2, p. 583–610.
- [3] G.A. Chechkin, T.A. Mel'nyk, Asymptotics of eigenelements to spectral problem in thick cascade junction with concentrated masses. *Applicable Analysis*, **91** (2012), no. 6, p. 1055–1095.
- [4] D. Blanchard, A. Gaudiello and T.A. Mel'nyk, Boundary homogenization and reduction of dimension in a Kirchhoff-Love plate, *SIAM J. Math. Anal.* **39** (2008), no. 6, p.1764-1787.