

## **Boundary conditions for the high order homogenized equation for a rod**

The high order homogenization technique generates the so called infinite order homogenized equation. Its coefficients were widely discussed in composite mechanics literature because they are closely related to the so called high order strain gradients theories. However, it was not clear, what is the correct mathematical setting for this equation and what are the asymptotically exact boundary conditions. In the present paper we give a variational formulation for the high order homogenized equation by the projection of the initial problem on the "ansatz subspace". This approach for an elliptic problem set in the whole space was applied earlier by K.Cherednichenko and V.P.Smyshlyaev and it gave the regularizing correctors for the N.Bakhvalov's high order homogenized equation. However the question of an appropriate set of boundary conditions for this equation was still an open problem. Here we add some special boundary layers correctors to the Bakhvalov's ansatz and then the projection on this ansatz space gives the high order homogenized equation and the appropriate boundary conditions for this high order homogenized equation. The error estimates for the solution of the original problem and the homogenized one are obtained. The main result is published in G.Panasenko "Boundary conditions for the high order homogenized equation: laminated rods, plates and composites" C.R.Mecanique 337 (2009) 8-14