

# Homogenization of the waveguides with frequent alternation boundary condition

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We consider Laplacian in a planar strip with Dirichlet boundary condition on the upper boundary and with frequent alternation boundary condition on the lower boundary. The alternation is introduced by the periodic partition of the boundary into small segments on which Dirichlet and Neumann conditions are imposed in turns. We show that under the certain condition the homogenized operator involves either Dirichlet or Neumann boundary condition on the lower boundary and prove the uniform resolvent convergence. The spectrum of the perturbed operator consists of its essential part only and has a band structure. We construct the leading terms of the asymptotic expansions for the first band functions. We also construct the complete asymptotic expansion for the bottom of the spectrum.