Scattering problem for coupled two-dimensional waveguides: asymptotical approach

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The system of two planar waveguides laterally coupled through small windows is considered. The problem of wave propagation in such system reduces to two-dimensional Helmholtz equation. We assume that the Neumann boundary condition takes place. It corresponds to the system of magnetic coupled quantum layers or acoustic waveguides with hard walls. The existence of coupling windows leads to the existence of quasi eigenvalues (resonances) near the second (and third, fourth, etc.) threshold. We construct the asymptotics (in the width of windows) of resonances for the Neumann Laplacian for this system. The cases of one coupling window, finite number of windows and periodic system of windows are considered. We use method of matching of asymptotic expansions of solutions of boundary value problems. The scattering problem is considered for the case of one and two coupling windows in resonance regime in the framework of the asymptotic approach. The dependence of the transmission coefficient on the parameters of the system is studied.

References

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