Modeling of transport properties
of two coupled layers

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The system of two quantum layers laterally coupled through small apertures is considered. We assume that the Neumann boundary condition takes place (i.e. metallic nanostructures or acoustic layers with hard walls are considered). Influence of coupling apertures results in resonant effects in wave scattering. To describe scattering it is necessary to find the asymptotics of quasi eigenvalue of the corresponding Neumann Laplacian near the second (and third, fourth, etc.) threshold. The cases of one coupling aperture and finite number of apertures are considered. We use the method of matching of asymptotic expansions of solutions of boundary value problems. The wave propagation is studied for the case of one and two coupling apertures. The scattering amplitude as a function of two normalized wave vectors is described in a neighbourhood of the resonance.

References

[1] I.Yu.Popov: Asymptotics of bound states and bands for laterally coupled waveguides and layers. *J. Math. Phys.* **43** (1), 215-234 (2002).