Simulating a class of active acoustic cloaking devices

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Abstract

We investigate a class of active acoustic cloaking devices where the device and the cloaked region can be mapped into two nested balls. Finite energy solutions for these acoustic cloaking devices are studied in weighted Sobolev spaces with singular weights. We describe the behavior of the finite energy solution in the cloaking medium, in the cloaked region, and at the interface between the two regions. A novel hidden boundary condition is discovered at the exterior cloaking interface. A special finite element method is proposed for simulating these devices. Numerical experiments illustrate the effectiveness of this discretization.

This work is in collaboration with H. Liu and G. Uhlmann from the Maths Department.