

How to make obstacles appear more (or less) visible by exterior measurements

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ABSTRACT

In this talk, we deal with the acoustic inverse scattering problem for detecting obstacles from the farfield map. The complex obstacle is characterized by its shape, the type of boundary data and the boundary coefficients (surface impedance). We particularly show how one can use the boundary coefficient, distributed along the surface of the obstacle, to make this obstacle appear more (or less) visible from farfield measurements. We explain this by using the probing methods (like the probe or the singular sources methods). However, similar results can be also given by using the sampling methods (like the linear sampling method and may be the factorization methods and the MUSIC algorithms). After computing the indicator functions of the probing methods from the farfield map, we give their asymptotic analysis near the surface of the obstacle with respect to the used point sources or multipoles. The first order term of the real parts give the location of this surface and the unit normal vectors on it while the second order terms involve the curvature coupled, in a clear and simple way, with the imaginary part of the surface impedance. This relation enables us to use the surface impedance (the coating coefficient) to make the obstacle appear more (or less) visible from farfield measurements.