

Determination of polyhedral scatterers by a single far-field measurement: uniqueness and stability

We consider the inverse acoustic scattering problem of determining scatterers, like obstacles or screens, by performing far-field measurements, that is by measuring the far-field pattern of the scattered field corresponding to one or more incident fields. We take as an incident field a time-harmonic acoustic plane wave, which is characterized by its wavenumber and direction of propagation. The scattered field is given by the reflection of the incident field due to the presence of the scatterer.

A long-standing conjecture is that, at least for sound-soft obstacles, a single measurement uniquely determines the scatterer, regardless of the wavenumber and direction of propagation of the incident field.

In a recent paper, joint with G. Alessandrini, such a conjecture has been proved for a particular class of scatterers, namely polyhedral scatterers. We present this result and we address the issue of finding corresponding stability estimates.