

Detecting and focusing on targets embedded in complex media

Antton Goicoechea
CNRS, IETR Rennes

Multiple scattering is generally difficult to deal with from an imaging perspective, because all of the information gets mixed as the wave propagates. I will show results about detection of a target embedded in a strongly scattering medium, for which conventional imaging techniques fail. The basic idea is to exploit prior knowledge about the target and use wavefront shaping techniques available with the measurement of a scattering matrix. More precisely, I will first demonstrate how to utilize the nonlinearity of a target by measuring the scattering matrix of the system for two incident powers at a single frequency. Experimental results obtained for electromagnetic waves in the microwave regime will be shown. Then, a second approach based on the measurement of the target's reflection matrix in a homogeneous system will be presented, with experimental realizations in acoustics.