

Reduced order model approach for imaging with waves

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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.