

# Handling acoustic scattering via scattering transforms: Robust classification of objects under geometric deformations from acoustic wavefields

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We will discuss our new method to classify objects either illuminated by sound (sonar scenario) or emanating sound (bioacoustics), which is insensitive to geometric deformations of the objects (e.g., position change, rotations, shape deformations, etc.). Our method first constructs redundant features that are insensitive to those deformations by computing the scattering transform representation of input acoustic waveforms. Then, the LASSO-based multiclass logistic regression extracts a small number of critical features and classify them. We will demonstrate its power using both synthetic and real examples and compare its performance with other invariant pattern classification techniques. We will also emphasize the importance of acoustic wavefield modeling and simulation using the fast Helmholtz solver based on the boundary integral equations. If time allows, we will also discuss how to incorporate the shearlets within the scattering transform framework for acoustic waveform recognition, which we named as the "shattering transform". This is a joint work with David Weber.