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Features for propagation-invariant classification of underwater targets

Patrick Loughlin and Greg Okopal
University of Pittsburgh, 348 Benedum Engineering Hall, Dept. of Electrical & Computer Engineering,
Pittsburgh, PA 15261, USA

As sound propagates in shallow water, it is subject to frequency-dependent spreading and attenuation (dispersion and damping). In active sonar, these propagation-induced changes can be detrimental to automatic classification because the observed backscatter depends on the propagation environment and how far the wave has traveled. One way to address this problem is to develop propagation-invariant features of the wave that can be used in automatic classification. In this talk, we present temporal, spectral, and cepstral moment-like features of a wave that are invariant per mode to dispersion and damping. Classification results on numerical simulations of the backscatter from different steel shells propagating in a Pekeris waveguide with damping and random variations will be presented. [Supported by ONR grants N00014-06-1-0009 and N00014-07-10355]