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Random coding for forward modeling

Compressed sensing has shown us that sparse signal acquisition can be made efficient by injecting randomness into the measurement process. In this talk, we will show how these same ideas can be used to dramatically reduce the computation required for two types of simulation problems in acoustics. In the first, we show how all of the channels in a multiple-input multiple-output system can be acquired jointly by simultaneously exciting all of the inputs with different random waveforms, and give an immediate application to seismic forward modeling. In the second, we consider the problem of acoustic source localization in a complicated channel. We show that the amount of computation to perform “matched field processing” (matched filtering) can be reduced by precomputing the response of the channel to a small number of dense configurations of random sources.