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Quasi-deterministic forward scattering from the sea surface

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Gravity waves create focal regions and caustics in sound forward-scattered from the sea surface. Focal regions are associated with rapid variations in amplitude and Doppler shift, which can impact the performance of underwater communications systems and sonars operated near the shore. Single-bounce focal regions consist of a superposition of up to 3 micro-paths, each of which is associated with its own amplitude, time delay, and Doppler shift. Focal regions move systematically through the water column as the wave propagates. Studies of these effects in near-shore ocean experiments and a laboratory flume have shown that a quasi-deterministic analysis of wave scattering can lead to valuable insights about the underlying scattering process. [Work supported by ONR]