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Scattering by a partially exposed nearly rigid cylinder:
Experiments and analysis

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The backscattering from a partially exposed circular cylinder was measured for broad side illumination under conditions where the contributions associated with the elastic response of the cylinder were expected to be weak. Grazing illumination was used. Since the objective was to investigate the transition in the number of reflected rays with increasing exposure, it was convenient to partially submerge the cylinder through the free surface of a tank of water. The magnitude of the scattering was measured for ka between 9.6 and 16 where k is the acoustic wave number and a is the radius of the cylinder. The scattering varied smoothly as a function of the cylinder's exposure in agreement with analytical results based on a Kirchhoff approximation [K. Baik and P. L. Marston, *IEEE J. Oceanic Eng.* (accepted)]. The analysis is easily modified for the case a cylinder breaking through a flat hard interface. For the different types of rays, path length calculations (as a function of the exposure) that are part of that analysis are also relevant to identifying echoes in SAS images of partially exposed cylinders and spheres. [Research supported by ONR].