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Effects of Dissipation on Multiple Resonant Scattering of Monochromatic Waves by an Array of Cylinders ALI TABAEI, YILE LI, CHIANG MEI, Massachusetts Institute of Technology — As in crystallography and photonic physics, multiple scattering of incident waves by a periodic array of scatterers can induce Bragg resonance and bandgaps. Extending the asymptotic theory of Li and Mei (2007) for water waves passing an array of vertical cylinders, we consider the additional effects of viscous dissipation. Two types of the dissipation are treated. One is that in a laminar Stokes boundary layer near the cylinder; the results are relevant to sound waves scattering. The second is due to vortex shedding common around offshore structures. Starting from the resonance criterion known in solid state physics, asymptotic techniques are employed to derive two-dimensional coupled-mode equations for the envelopes of the scattered waves. Cylinders are assumed to be much smaller than the incident wavelength which is comparable to the cylinder spacing. To account for the effect of vortex shedding, the method of equivalent linearization is employed to model the nonlinear separation losses in the vicinity of cylinders. Analytical solutions are found for a long strip of cylinder array and the effects of dissipation loss on the attenuation of wave amplitudes throughout the strip are discussed.

Ali Tabaei
Massachusetts Institute of Technology

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