On the parameterization of surface and internal gravity wave reflectance

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We discuss the use of an acceleration-based nondimensional number, γ, to examine the reflectance of surface and internal gravity waves from sloped boundaries. The parameter is based on estimates of the acceleration of wave excursion on the bottom slope relative to the gravitational acceleration projected onto that slope. Unlike the commonly used Iribarren number, which is based on wave geometry and requires a two-dimensional description of the wave, γ may be calculated from velocity profiler data. The utilities of γ and the Iribarren number are explored by examining the reflectance of three types of shoaling waves: sinusoidal surface waves, solitary internal waves, and cnoidal internal waves. The proposed parameter improves the collapse of reflectance values of the wave categories. This result, combined with the demonstrated ease of its estimation from fixed point field measurements, suggests that the acceleration parameter may be useful in a range of applications.