



Bottom pressure induced by solitary wave passage: the Green-Naghdi framework

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Fully nonlinear weakly dispersive theory developed by Green & Naghdi (1976) is a good model to describe the cnoidal and solitary waves up to limited amplitudes in the coastal zone. Using this theory, the bottom pressure induced by the solitary wave passage in the basin of constant depth is calculated analytically. The temporal variation of bottom pressure is similar to solitary wave shape (bell-shape pulse). Its amplitude grows slowly with soliton amplitude increase than in hydrostatic limit. Obtained results re compared with computations within linear fully dispersive theory. Surprisingly, the difference in linear and nonlinear calculations is relatively small up to limited amplitudes. As a result, linear theory widely used in oceanographic practice can be applied for analysis of bottom pressure variations induced by the large amplitude solitary wave.