Geophysical Research Abstracts
Vol. 20, EGU2018-8168, 2018
EGU General Assembly 2018

Exact Solutions of of waves generated by slides of over constant slope

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Tsunami waves for submarine landslides that deform during their motion are often modelled using purely discretized numerical models. However, in this work we show that for a class of infinitely wide deformable blocks sliding down a constant slope, exact solutions of the linearized shallow water equations can be found for Froude numbers less than unity. There is a close relation between spherical harmonic functions with axial symmetry and the homogeneous solution of shallow water equation over a constant slope. In harmonic functions, if one replaces the coordinate associated with the symmetry axis with time multiplied by complex number i, and the distance to the symmetry axis by the to the square-root of the distance to the shoreline, then both real and imaginary parts of the harmonic function become solutions of the wave equation in 1D. At a particular instant the imaginary part of this harmonic function vanishes. This is used to model the waves with zero initial velocity. This solution can be modified to represent the wave generated by a slide with Froude number less than one. In this model the length of the sliding block proportional to the square of time. These solution are only valid for particular sliding histories. A numerical method is developed in order to express a general slide as a superposition of these particular slides for which exact solution can be found.