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Analytical solution for linear long water waves, propagating in divergent channels AGUSTÍN MORA, Univ Nacl Autonoma de Mexico, ERIC BAUTISTA, OSCAR BAUTISTA, JOSÉ HERNÁNDEZ, Instituto Politécnico Nacional — In this work, we obtain an analytical solution for the deformation of linear long water waves, propagating in a divergent channel of slowly varying crosssection, whose width of the channel obey a power-law distribution. By using an order of magnitude analysis and proposing characteristics lengths, the nonlinear governing equations of shallow water waves are simplified and written in dimensionless form. We derive a dimensionless wave equation that predicts the surface elevation, which is solved by using a novel technique which has the purpose on seeking the appropriate Bernoulli equation of the Boundary Value Problem studied. The analytical solution thus obtained is a function of two dimensionless parameters: a kinematical parameter, κ_2, which is the ratio of the wavelength to the channel length and one geometrical parameter Γ, which is the ratio of the width of regionR_1 to the width of region R_3. The present analytical solution, covers a wide range of linear long water waves, spreading in long divergent channels with different geometrical transitions. For values of the parameter $\Gamma > 1$ the channels proposed in the present work, represent an efficient attenuator of linear long water waves. In addition, the application of the present mathematical model is not limited to thestudied cases in the present work, because the methodology used here can be extended to more complex channel transitions and also the formula presented in this work, can be easly implemented in order to validated numerical solution of long water waves.

Agustín Mora
Univ Nacl Autonoma de Mexico

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