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Parabolic Wavelet Technique to Numerical Modelling of Sallow Water Acoustic

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In this paper, parabolic equation (PE) model is applied for environment of slowly varying with range and azimuth in a region of Persian Golf. This method is currently the most used to study propagation in non-stratified media. Due to required accuracy for a gridding step comparable with the wavelength, the computation load is very heavy. To overcome this disadvantage, we develop the weak form of PE formulation by the use of Deslauier-Daubuc interpolating wavelet (DDW) basis functions. The formulation is similar to combination of conventional Finite Element Method (FEM) and split step technique except that, here DDW basis is used for approximating in depth to reduce the cost of computations and to increase the accuracy of method by the use of multi-resolution structure of wavelets. The localized and circulant representations of depth differential operators based on DDW connection coefficients allow efficient imposition of boundary values and circumvent some disadvantages of the traditional PE. Furthermore, details of bottom boundary imposing and some disadvantages of approach are presented. Numerical experiments are performed to study two layers water-bottom environment with none-smooth sediment interface to some canonical standard test problems in comparison with solutions obtained by conventional PE method.