EXACT AND NUMERICAL SOLUTIONS OF BOUSSINESQ-NWOGU EQUATIONS (S. Hamdi, Y. Ouellet and W.E. Schiesser)

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New exact solitary wave solutions for the Nwogu's (O. Nwogu, ASCE J. Waterw., Port, Coast., Ocean Eng., 119, 618-638 (1993)) one-dimensional extended Boussinesq equations are presented. New analytical expressions of several invariants of motions (mass, momentum, energy and Hamiltonian) are also derived. A numerical solution procedure based on the method of lines for solving a wide range of Boussinesq equations is devised. The numerical scheme is fifth order accurate in time and fourth-order accurate in space, thus reducing all truncation errors to a level smaller than the dispersive terms retained by most extended Boussinesq models. The exact solitary wave solutions are used to specify initial data for the incident waves in the numerical model of Nwogu and also for the validation of the method of lines solution. The invariants of motions are monitored in order to assess the accuracy and the conservation properties of the numerical scheme.