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# Special solutions to a compact equation for deep-water gravity waves

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Recently, Dyachenko & Zakharov (2011) have derived a compact form of the well known Zakharov integro-differential equation for the third order Hamiltonian dynamics of a potential flow of an incompressible, infinitely deep fluid with a free surface. In this work, special traveling wave solutions of this compact equation are numerically constructed using the Petviashvili method. Their stability properties are also investigated. Further, unstable traveling waves with wedge-type singularities, viz. peakons, are numerically identified. An analytical solution of such peakons is derived also for a perturbed version of the compact equation. Finally, by means of an accurate Fourier-type spectral scheme it is found that smooth solitary waves appear to collide elastically, suggesting the integrability of the Zakharov equation.

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