Numerical study of oscillatory regimes in the Kadomtsev-Petviashvili equation

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Abstract:

The aim of this talk is the accurate numerical study of the KP equation. In particular we are concerned with the small dispersion limit of this model, where no comprehensive analytical description exists so far. To this end we first study a similar highly oscillatory regime for asymptotically small solutions, which can be described via the Davey-Stewartson system. In a second step we investigate numerically the small dispersion limit of the KP model in the case of large amplitudes. Similarities and differences to the much better studied Korteweg-de Vries situation are discussed as well as the dependence of the limit on the additional transverse coordinate. This work is extended to generalized KP equations. In particular we are concerned with the small dispersion limit of this model. Comparisons with the KP case and with the analytically far better understood KdV situation are drawn.

References:
1. C. Klein, C. Sparber and P. Markowich , 'Numerical study of oscillatory regimes in the Kadomtsev-Petviashvili equation', J. Nonl. Sci. Vol. 17(5), 429-470 (2007).
2. C. Klein and C. Sparber, 'Numerical simulation of generalized KP type equations with small dispersion', in 'Recent Progress in Scientific Computing', ed. by W.-B. Liu, Michael Ng and Zhong-Ci Shi, Science Press (Beijing) (2007).