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## **Extreme events in crossing sea states (co-authors: A R Osborne and M Serio)**

Recently crossing sea states have become of particular interest in the community of ocean waves. A recent study performed by Toffoli et al. [1], based on data collected from 1995 to 1999 by Lloyd's Marine Information Service, has revealed that a large percentage of ship accidents due to bad weather conditions has happened in crossing sea states. Therefore, understanding the properties of the surface elevation in these sea state conditions is of fundamental importance for an applicative point of view.

In order to address the problem here we consider a simple weakly nonlinear model that describes the interaction of two sea states in deep water with two different directions of propagation. Under the hypothesis that both sea states are narrow banded, we derive from the Zakharov equation a system of two coupled Nonlinear Schrödinger equations. Stability analysis and direct numerical simulations of the system will provide some indication on the formation of extreme events in crossing sea states.

### References:

[1] A. Toffoli, J.M. Lefevre, J.Monbaliu and E.Bitner-Gregersen, Dangerous sea state for marine operations, Proceeding on the 14th International Offshore and Polar Engineering Conference (ISOPE), Toulon, France, 24-28 May 2004.

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