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On the breaking onset threshold for water waves propagating on uniform sheared currents

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Recently, Barthelemy et al. (2018) investigated numerically the local properties of 2D and 3D nonlinear unsteady gravity wave packets in deep and uniform intermediate depth water. Their study focused on the breaking onset transition zone separating maximum recurrence and marginal breaking. These authors reported that a suitably normalized energy flux localized at the steepest crest in the packet provides a robust breaking onset threshold parameter.

Our present study uses the fully-nonlinear BIEM solver developed by Touboul & Kharif (2016) to investigate breaking onset of 2D deep water nonlinear water wave packets propagating in the presence of a background current that varies linearly with depth. We investigate whether the proposed generic breaking onset threshold holds for the case of constant background vorticity. Results will be presented for different packet bandwidths and background vorticity levels.

[1] X. Barthelemy, M. L. Banner, W. L. Peirson, F. Fedele, M. Allis & F. Dias, “On a unified breaking onset threshold for gravity waves in deep and intermediate depth water”, J. Fluid Mech., In Press, (2018).

[2] J. Touboul & C. Kharif, J. Touboul & C. Kharif "Effect of vorticity on the generation of rogue waves due to dispersive focusing", Nat. Haz., 84 (2), 585–598, (2016).