Experimental study of soliton interaction with a vertical wall

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The occurrence of a residual jet in the case of interaction of two large counter propagating solitons was found numerically in the paper [J .Chambarel, C.Kharif , and J.Touboul, Head-on collision of two solitary waves and residual falling jet formation, Nonlin. Processes Geophys., 16, 111-122, 2009] using a Boundary Integral Equation Method (BIEM). This phenomenon occurs for amplitudes of soliton larger than a threshold value (the normalized amplitude of soliton has to be larger than 0.60).

We check this effect experimentally and consider soliton interaction with a vertical wall that corresponds to the case of collision of two identical counter propagating solitons. The impact on the wall is compared with the jet found in numerical simulations. The experimental canal is located in Ecole Central de Marseille (France) and has the following dimensions (220*20*40cm). Solitons are generated by a piston wavemaker. Results could be applied to the problem of big wave formation on the coast and on the coastal structures.