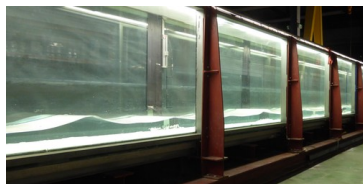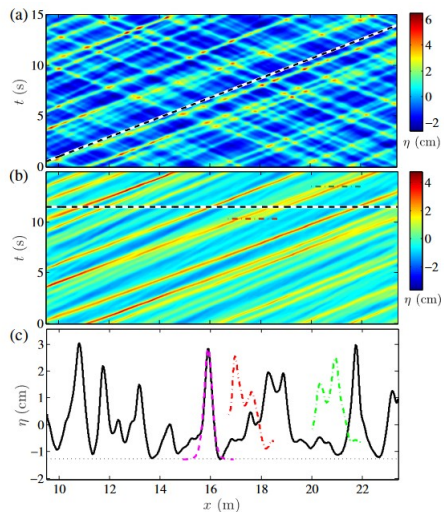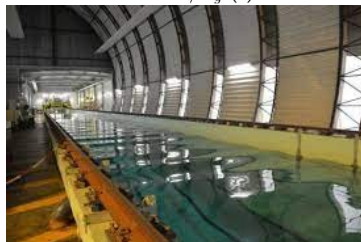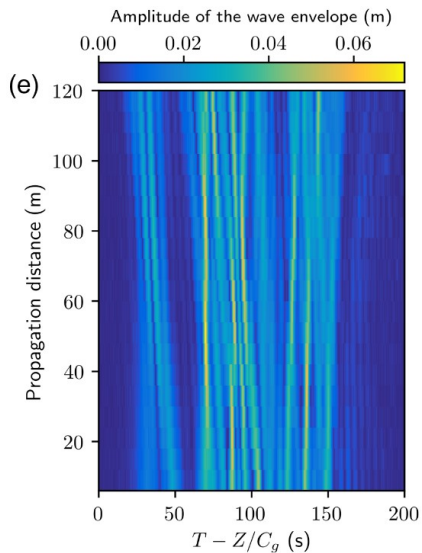# Interaction of soliton gas in deep-water surface gravity waves

L. Fache, F. Bonnefoy, G. Ducrozet, F. Copie, F. Novkoski, G. Ricard, G. Roberti, E. Falcon, P. Suret, G.A. El, S. Randoux

Soliton Gas

Ref : Ivan Redor et al. *Experimental Evidence of a Hydrodynamic Soliton Gas, 2019, PRL*

Ref : Pierre Suret et al. *Nonlinear Spectral Synthesis of Soliton Gas in Deep-Water Surface Gravity Waves, 2020, PRL*

Ref : Pierre Suret et al. *Soliton refraction through an optical soliton gas, 2023, PRR*

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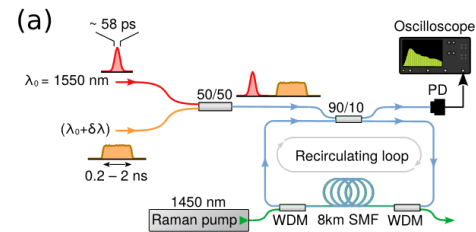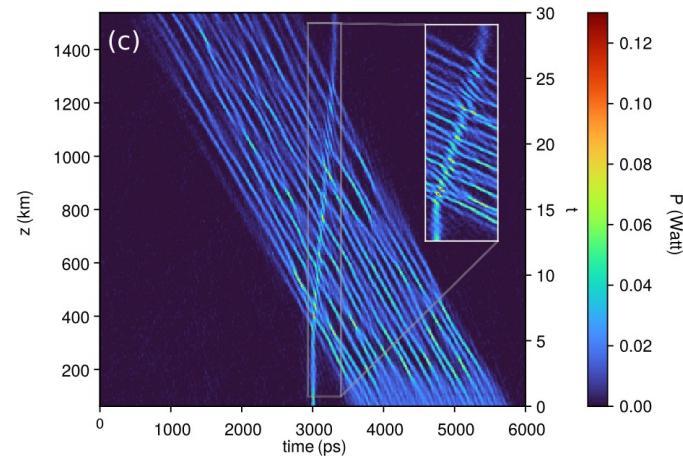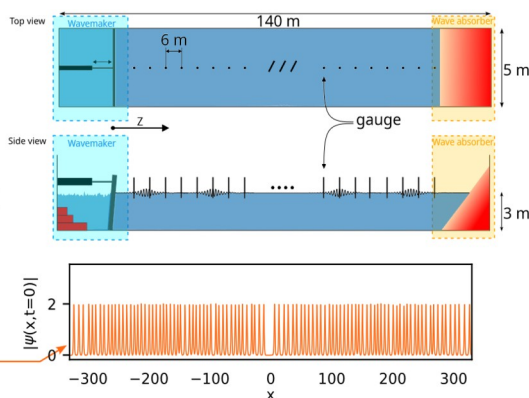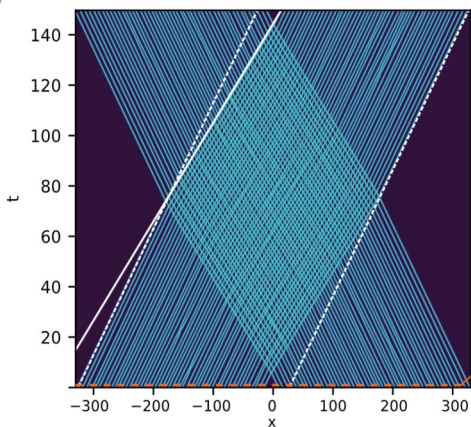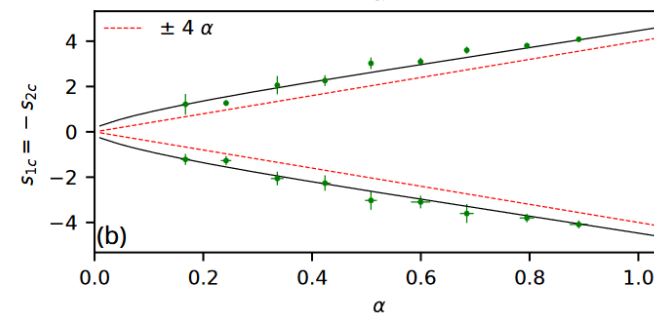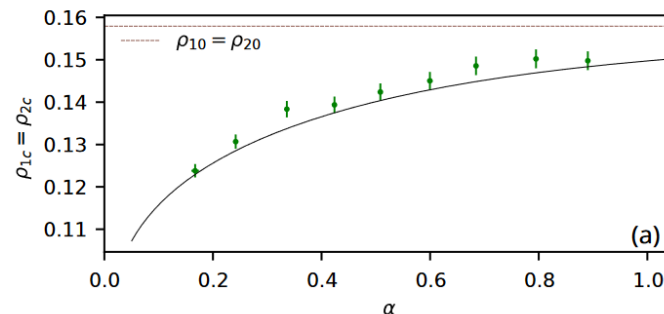
Ref : Loïc Fache et al. *Interaction of soliton gases in deep-water surface gravity waves, 2024, PRE*

$$i\psi_t + \psi_{xx} + 2|\psi|^2\psi = 0.$$

Kinetic Equations

$$\frac{\partial f}{\partial t} + \frac{\partial (sf)}{\partial x} = 0,$$

$$s(\lambda; x, t) = -4\operatorname{Re}(\lambda) + \frac{1}{\operatorname{Im}(\lambda)} \iint_{\Lambda^+} \ln\left|\frac{\mu - \lambda^*}{\mu - \lambda}\right|$$

$$\times \left[s(\lambda; x, t) - s(\mu; x, t)\right] f(\mu; x, t) d\xi \, d\zeta,$$