Contribution Title: INTEGRABILITY ANALYSIS OF A NONLOCAL OSTROVSKY-WHITHAM FLOW

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1. The Ostrovsky-Whitham medium model with spatial memory: We consider an Ostrovsky-Whitham type nonlinear medium model described by the evolution equation

$$du = dt = 2uu_x + \int_{\mathbf{R}} K(u;s)u_s ds$$

discussed first in [2]. If the corresponding Whitham kernel $K$ is of the form $K(x;s) :=¡\mu(x¡s)us$ for $x, s \in \mathbf{R}$; naturally modeling [1] the relaxing spatial memory effects, the equation becomes

$$du = dt = 2uu_x + \int_{\mathbf{R}} ¡\mu(x¡s)usu_s ds,$$

or

$$\dot{u} = K[u], \tag{1}$$

and is strongly nonlocal and appears to possess very interesting mathematical properties.

2. Regularization and Lax integrability: We prove that the following regularized nonlinear dynamical system $u_t = 2uu_x¡v$; $v_t = 2uv_x$, or

$$(u_t, v_t) := K[u, v], \tag{2}$$

which is of hydrodynamic type and well defined on the extended 2-1/4 -periodic function space

$$M := C^1_{9/4}(\mathbf{R}; \mathbf{R}),$$

and completely equivalent to that given by expression (1), which is a Lax integrable bi - Hamiltonian flow.

[1] Ostrovsky L.A. Nonlinear internal waves in a rotating ocean, Oceanology, 1978, v. 18, p.119-125.
[2] Whitham G.B. Linear and Nonlinear Waves. Wiley-Interscience, New York, 1974, 221p.