Meeting: 1001, Evanston, Illinois, SS 14A, Special Session on Nonlinear Waves

1001-35-357 **Robert L Pego*** (rpego@andrew.cmu.edu), Department of Mathematical Sciences, Carnegie Mellon University, Pittsburgh, PA 15213, and **Guido Schneider** and **Hannes Uecker**. *On the persistence of KdV solitons in the unstable dynamics of inclined film flow.* Preliminary report.

The KS-perturbed KdV-equation (KS-KdV)

$$\partial_t u + \partial_x^3 u + \frac{1}{2}\partial_x(u^2) + \varepsilon(\partial_x^2 + \partial_x^4)u = 0,$$

with $0 < \varepsilon \ll 1$ a small parameter, arises as a model equation for small-amplitude long waves on the surface of a viscous liquid running down an inclined plane, in certain regimes when the trivial Nusselt solution is sideband unstable. Individual pulses are unstable due to the long-wave instability of the flat surface, but computation and experiments suggest that the dynamics of KS-KdV is dominated by traveling pulse trains. In order to add to the understanding why this is the case, we prove that the KdV manifolds of n pulses are stable in KS-KdV on a time scale of order $1/\varepsilon$ with respect to perturbations that are $O(1)$ in $H^n(R)$. (Received August 31, 2004)