EPFL

B. Buffoni – M. Colombo – J. Krieger – Mathematics Section

SEMINAR OF ANALYSIS

FRIDAY 17 March 2023 - Room: MA B1 524 at 2:15 pm

Prof. Mats Ehrnström
(Norwegian University of Science and Technology)

will present a seminar entitled:

« On two new constructions of solitary waves of the nonlinear and nonlocally dispersive Whitham equation »

Abstract:

"Solitary waves in dispersive and water wave equations are often constructed using either constrained minimisation or perturbative techniques around a trivial flow. In both cases, the resulting waves are typically small, because of nonlinear control. We present here two new proofs for existence of solitary waves in the nonlinear and nonlocal evolution equation

$$u_t + Lu_x + uu_x = 0, \qquad \mathcal{F}(Lu)(\xi) = \left(\frac{\tanh(\xi)}{\xi}\right)^{1/2} \mathcal{F}u(\xi),$$

also called the Whitham equation. The first proof is based on a priori estimates of periodic waves of all heights, and uses a limiting argument in the periodic to obtain a family of solitary waves up to the highest wave. The second uses a maximisation technique perhaps not earlier used in the water wave setting, where the dispersive part of the energy functional is maximised whereas remaining terms are held as a constraint in an Orlicz space constructed directly for this purpose. That is in many respects an L^p-based maximisation technique. We find in the second work small and intermediate-sized waves, although not necessarily a highest solitary wave.

The first work is joint with K. Nik and C. Walker; the second with A. Stefanov and M. N. Arnesen."

Lausanne, March 2023
BB/rb

Seminars are announced on the Mathematics Section website:
http://memento.epfl.ch/maths/