

# Extreme solitary solution for a nonlinear pseudodifferential equation

**Tien Truong**

Lund University

*tien.truong@math.lu.se*

## Abstract

In this talk, we illustrate how recent nonlinear-analysis tools can be used to prove existence of an extreme solitary solution for a nonlinear pseudodifferential equation. A solution is solitary if its shape is permanent in time and localised in a region when time is fixed. It is extreme if it reaches the highest possible amplitude. The first tool states that because the pseudodifferential operator involved has an exponentially localised convolution kernel, the equation is essentially an ODE. Then, using familiar ODE results, we find a curve of small-amplitude solitary solutions. The second tool is a global bifurcation theorem, which continuously extends the found solution curve. Finally, by taking the limit of solutions along the extended curve, an extreme solution is obtained. In this case, it attains extremity by sacrificing smoothness and thus blowing up in its Sobolev norm. This is a joint work with Erik Wahlén from Lund University and Miles Wheeler from the University of Bath