Karlsruhe Institute of Technology

Seminar of the Work Group
Nonlinear Partial Differential Equations
WS 25/26

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Rogue Waves for a Semilinear Wave Equation

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Abstract

We consider the semilinear wave equation

$$V(x)\partial_t^2 u + d(t)M(x,\partial_x)u = V(x)\tilde{d}(t)|u|^{p-1}u, \quad (x,t) \in \mathbb{R}^N \times \mathbb{R}, \tag{$\star$}$$

where M is in general an elliptic operator and $p \in (1, p^*)$. Under suitable conditions on M and on the coefficients V, d and $\tilde{d}$, we show the existence of solutions which are localized in space and in time, so-called rogue waves, by means of variational methods. We discuss our approach in detail and provide examples of $M, V, d, \tilde{d}$ which satisfy our assumptions.