An Introduction to Physics Informed Neural Networks and Their Application to Nonlinear Dispersive Equations

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In recent years, Deep Learning (DL) techniques have emerged as powerfultools for approximating solutions to certain partial differentialequations (PDEs). Most applications to date focus on bounded domains,due the capability of traditional numerical methods. In this talk, weintroduce a novel approach that combines Physics Informed NeuralNetworks (PINNs) -a recently developed DL framework- with stabilitytheory to approximate solutions of nonlinear dispersive equations posedon unbounded domains. We specifically explore the effectiveness of PINNsin addressing the nonlinear Schrödinger and generalized Korteweg-deVries (gKdV) equations, highlighting how this method can be employed inthe absence of boundary conditions.

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