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Applied Math and Numerical Analysis Seminar

Physics-informed neural networks for multiscale hyperbolic models for the spatial spread of infectious diseases

by

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Abstract :
When investigating epidemic dynamics, the model parameters, necessary for understanding the phenomenon and to simulate forecast scenarios, require a delicate calibration phase, often made even more challenging by the scarcity and uncertainty of observed data reported by official sources. In this context, we proposed to employ physics informed neural networks (PINNs) to infer parameters for epidemic models. Yet, in many circumstances, the spatial propagation of an infectious disease is characterized by movements of individuals at different scales governed by multiscale differential models. Therefore, a direct application of PINNs generally leads to poor results due to the multiscale nature of the differential model in the loss function of the neural network. To allow the neural network to operate uniformly with respect to the small scales we must guarantee the asymptotic preservation (AP) property in the loss function. To this aim, we introduce a new class of AP neural networks (AP-PINNs) for multiscale hyperbolic transport models of epidemic spread. A series of numerical tests confirm the validity of the proposed approach.

Date :	March 2, 2023 (Thursday)
Time :	3:00pm – 4:00pm (Hong Kong SAR)
Zoom link:	https://cuhk.zoom.us/j/9792985952
Meeting ID:	9792985952
Passcode:	202266

All are Welcome