QUANTIFYING UNCERTAINTY IN DEEP LEARNING FOR FLUID FLOW RECONSTRUCTION

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ABSTRACT

In this talk, I will introduce recent research that quantifies aleatoric and epistemic uncertainties in deep learning function approximation with specific applications to fluid flow reconstruction from sparse sensors. In our deployments, we use a mixture of experts' technique to quantified aleatoric uncertainties while Bayesian model averaging techniques are used to quantify epistemic uncertainty. Our methods are tested for various real-world applications such as for reconstructing the vorticity field behind a NACA0012 airfoil, the sea-surface temperature given sparse observations, and channel flow turbulence fields given tracer information.