***Learning nonlinear operators via DeepONet***

**Lu Lu** @ (University of Pennsylvania)

R 3.07 Tue Z1 14:00-14:30

It is widely known that neural networks (NNs) are universal approximators of continuous functions. However, a less known but powerful result is that a NN with a single hidden layer can accurately approximate any nonlinear continuous operator. This universal approximation theorem of operators is suggestive of the structure and potential of deep neural networks (DNNs) in learning continuous operators or complex systems from streams of scattered data. We design a new network with small generalization error, the deep operator network (DeepONet). We demonstrate that DeepONet can learn various explicit operators, such as integrals and fractional Laplacians, as well as implicit operators that represent deterministic and stochastic differential equations. Furthermore, we extend DeepONet to DeepM&Mnet, a new data assimilation framework for simulating multiphysics and multiscale problems at speeds much faster than standard numerical methods.