Contribution ID: **49** Type: **Poster**

Data-driven computational continuum mechanics

Thursday, July 30, 2020 1:00 PM (1 hour)

My research's topic focuses on developing and investigating computational data-driven methods in order to model the material laws from observed data. The methodology is expected to deliver the governing mathematical model of the observed problem in the form of a set of symbolic equations that potentially enable new discoveries in data-rich fields of continuous physical problems. Artificial neural networks (ANN) have been proposed as an efficient data-driven method for constitutive modelling, accepting either synthetic data solutions or experimental datasets. Sparse regression has the potential to identify relationships between field quantities directly from data in the form of symbolic expressions. Depending on the richness of the given data (function values vs. gradients, densely vs. sparsely sampled) specific techniques are required to obtain accurate numerical evaluations of spatial and temporal derivatives from sparse data representing smooth or non-smooth states; e.g. via hierarchical multi-level gradient estimation, Gaussian smoothing or gradient capturing techniques. A machine learning prototype is implemented using the FEniCS framework coupled with a trained neural network on the basis of PyTorch.

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