

RECENT ADVANCES IN THE DEVELOPMENT OF RELIABLE NEURAL SIMULATORS BASED ON GRAPH ARCHITECTURES

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ABSTRACT

Of all the contributions that AI is making to computational mechanics, the possibility of developing learned simulators is one of the most interesting. Of course, there is a whole ecosystem of techniques that can be used for this purpose, but the use of geometric deep learning is perhaps one of the most promising.

Of particular interest is the so-called graph neural network architecture, since traditional finite element meshes can themselves be considered a graph. Thus, it is very convenient to train such architectures with synthetic data obtained by high-fidelity simulation. As will be seen in our presentation, graph networks (possibly informed by physics) allow a very high degree of generalization, as well as the level of accuracy they provide.

In this talk we will show details about the inner workings of such networks, particularly the message passing scheme, and we will see how reliable they are for use in problems involving plasticity.

REFERENCES

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