(Real-Time) Digital Twins – An Opportunity for Scientific Machine Learning

D. Hartmann[1]

[1]Siemens, hartmann.dirk@siemens.com

Digital Twins are one of the hottest digital trend. In this contribution, we will shortly review the concept of Digital Twins as well as corresponding opportunities beyond their typical use in R&D, e.g., advanced monitoring and diagnostics solution leveraging real time models and ultimately enabling more efficient operations and higher availability.
While the opportunities are attractive, the economical identification of mathematical models underlying digital twins are a major road blocker today. These should be accurate, fast-to-evaluate, robust, and parsimonious. However, today this is typically a manual task requiring sophisticated experts. This is limiting scalability in many industrial applications.
The emerging field of scientific machine learning offers a promising research direction addressing this challenge. We will detail some of the concepts along the example of differentiable solver approaches in the context of operator inference methods. And close the presentation with highlighting opportunities for mathematical research and innovation.