

ADVANCED MATHEMATICAL AND COMPUTATIONAL METHODS FOR SOLVABILITY, OPERABILITY, AND SECURITY CHALLENGES IN CYBER-PHYSICAL SYSTEMS

FRIDAY: SESSION 4, TRACK 1

SESSION CHAIRS

- Craig Bakker, Pacific Northwest National Laboratory (Chair)
- Samrat Chatterjee, Pacific Northwest National Laboratory (Co-Chair)

SESSION ABSTRACT

Critical infrastructures, such as the power grid, are important examples of Cyber-Physical Systems (CPSs), but they are often too complex for closed-form, bottom-up modeling approaches. To produce computationally tractable representations, it has historically been necessary to make simplifying assumptions (e.g., convexity, continuous dynamics, and no adversarial activities). The increased complexity of critical infrastructure systems – including increased cyber connectivity – has called into question the validity of some of these assumptions and raised new solvability, operability, and security challenges for such systems. Advances in computing hardware, machine learning, and computational mathematics, however, have also provided new capabilities. This session will focus on algorithms and techniques that leverage those new capabilities to address solvability, operability, and security challenges for CPSs with a particular focus on critical infrastructure.

TOPICS

This session will consist of six invited 20-minute talks (15 minutes for presentation, 5 minutes for questions) given by researchers (industrial as well as academic) and government agency representatives. Researchers are encouraged to present TRL 2-3 methods and results pertaining to solvability, operability, and security challenges in CPSs with a particular focus on the mathematical underpinnings of their approach. Government agency representatives are encouraged to discuss the particular technical challenges they face and research avenues they believe to be promising.