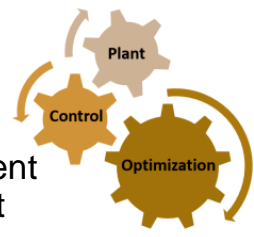




Project Description

- Thermal demands on energy systems are facing unprecedented growth
- Both static design *and* transient performance constraints exist on thermal system design – design and control are coupled!



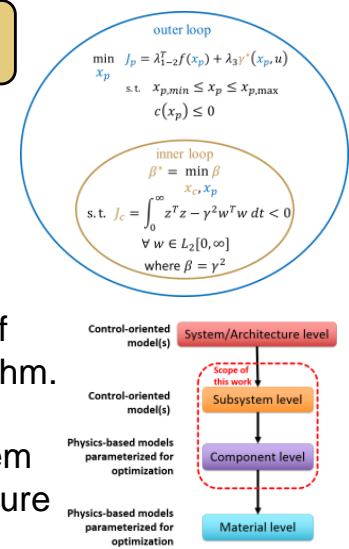
This research leverages combined plant and control design (co-design) to reimagine the way we design thermal management systems.

Approach

Objective 1: Develop a co-design algorithm that captures dynamic elements common to thermal management system transient performance.

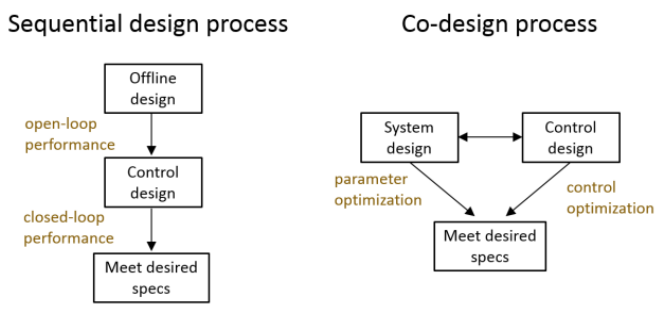
Objective 2: Incorporate mechanisms for optimizing notions of steady state and transient efficiency into the co-design algorithm.

Objective 3: Integrate the co-design algorithm at the subsystem level with a design optimization at the component level to ensure that transient performance specifications are satisfied.

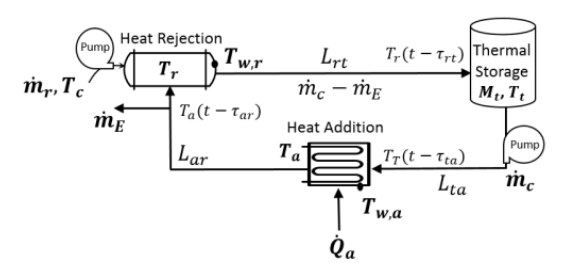
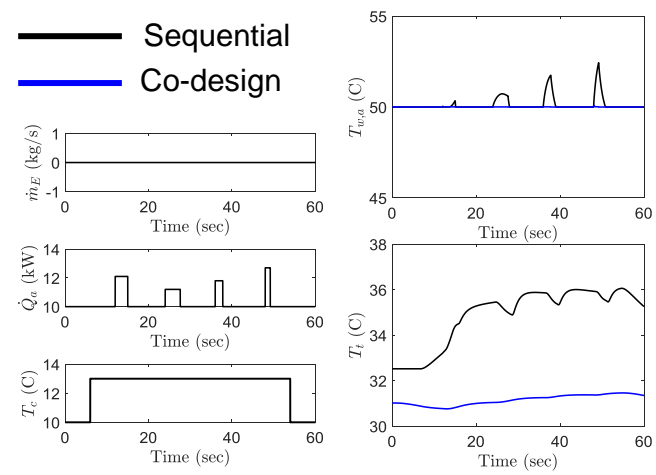


Discussion

Co-design broadens the design space to offer quantifiable performance improvements over sequential (traditional) design methods.



Results



The co-designed system is more robust to external disturbances common to thermal management system operation.

By considering control design at the plant (system) design stage, we can improve the thermal capabilities and robustness of thermal management systems.

