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Remedial Actions to Enhance Stability of Low-Inertia Systems

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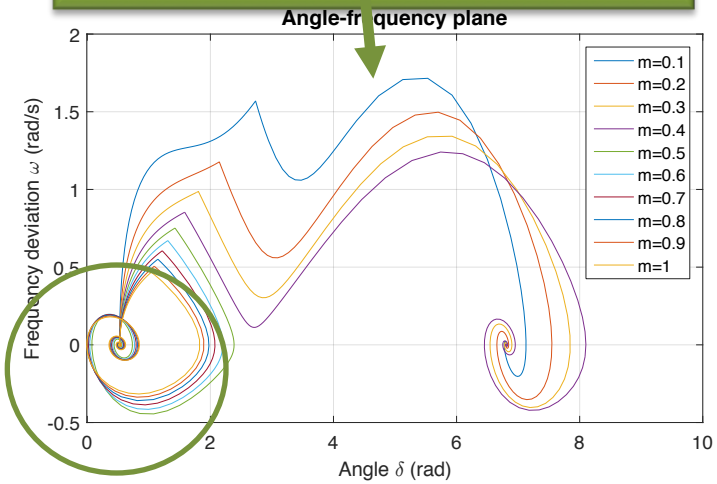
Motivation

- Enhance transient stability of low-inertia systems through inertia and damping control
  - Use of external power sources to provide synthetic inertia and damping
- Use a simulation-free approach
  - Use of stability certificates
  - Generalize the Energy Function

Low-inertia systems are more prone to instability



Stable equilibrium

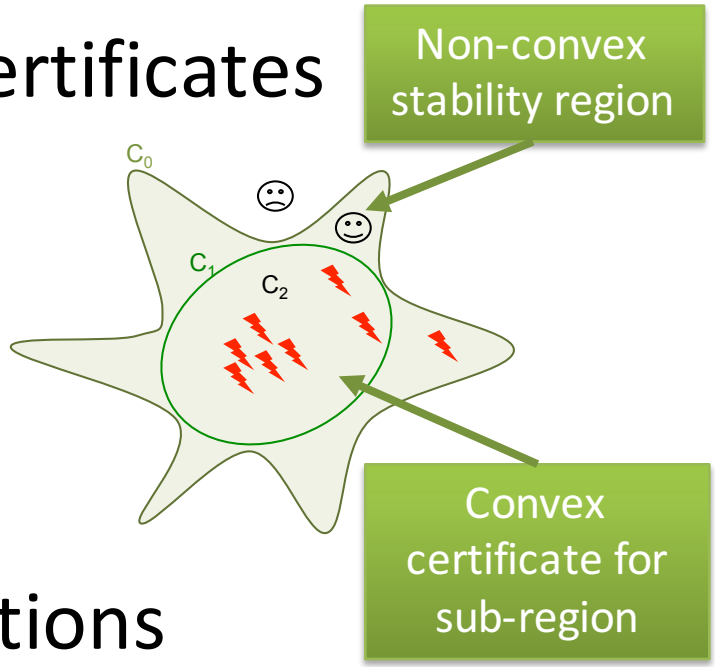
Contributions

- Use of quadratic Lyapunov functions
  - Relax the approach through an exact reformulation that provides better results

- Incorporate the use of inertia and damping control as an optimization problem
  - Optimal tuning of synthetic inertia and damping so that the fault-on trajectory does not escape the stability region

Conclusions

- New approach for stability certificates
  - Simulation-free
  - Convex
  - Less conservative



- Incorporation of remedial actions
  - Use of high-power low-energy external power sources for very short times to enhance stability
  - E.g. flywheels

Thank you!

Come and discuss with us at the Poster

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