

## Steady states of reduced quadratic models obtained by lifting nonlinear second-order models

In recent work, we have reduced nonlinear second-order power grid models using balanced truncation techniques for quadratic systems. In order to do that, we 1) transform the original system to a first-order system and 2) use lifting to quadratize the first-order system. However, although the original quadratized system reaches steady state, the reduced quadratic system may only reach a partial steady state where a subset of the state variables continue to grow at a constant rate. In order to address this issue, it would be useful to know, given a reduced quadratic system, 1) if there exists steady states and 2) if they are stable. In this presentation, we look into the cause of the problem and preliminary attempts at answering the two questions.

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**Track Classification:** Talks