Abstract
Because the complexity of bipedal walking robots doubles when increasing a model from 2D to 3D, many previously established analytical techniques are computably impractical for 3D models. This project offers a systematic approach to reducing a 3D hybrid model into two dimensions, on which 2D analytical methods can be used, such as numerical analysis to find the limit cycles that result in asymptotically stable walking.

Motivation
The Scaling Complexity Problem: From 2D to 3D
- Increasing the model’s dimensions from two to three results in a two-fold increase of state dependency
- Thus, in three dimensions, numerical analysis requires a phase space search of eight dimensions
- Analysis is computably impractical!

Acknowledgements
A special thank you to Aaron D Ames, Haiyang Zheng, Jonathan Sprinkle, Simon Ng, and CHESS!