Efficient Methods for Order Reduction of Zonotopes

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Zonotopes

- Zonotopes are set representations defined by

\[ \mathcal{Z} = \{ c + \sum_{i=1}^{p} \alpha_i g^{(i)} | \alpha_i \in [-1, 1] \}, \ c \in \mathbb{R}^n, \ g^{(i)} \in \mathbb{R}^n \]

- \( \mathcal{Z} \) is the Minkowski sum of line segments \( l^{(i)} = [-1, 1]g^{(i)} \)

[M. Althoff: CORA 2015 Manual]
Order Reduction of Zonotopes: Different Ways
Topic: Efficient Methods for Order Reduction of Zonotopes

- Different ways possible to reduce zonotope order
- Resulting zonotopes and computation times differ significantly
- **Goal:** Find a fast and numerical stable approach for order reduction of high-dimensional zonotopes
- **Tasks:**
  - Develop new approach for order reduction of zonotopes
  - Implement new approach and/or existing approaches in Matlab
  - Compare the approaches
- **Note:** This topic is not a pure literature review nor implementing something existing. Instead you get the opportunity to come up with new solutions and try them. If this sounds interesting to you, this might be a great topic for you!
Questions?

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