Bounded Disturbance Amplification in Mass Chains

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Main Topic

Disturbance amplification in mass chains

Applications

- Vibration suppression in tall buildings subjected to earthquakes
- Spacing control in vehicle platoons

Y: mechanical admittance
Intermass Disp. Transfer Functions

Transfer function from a movable point displacement to a given intermass displacement.

- Is it possible to achieve uniform boundedness of these transfer functions?

\[ G_N^{(i)}(s) := \frac{e_i(s)}{x_0(s)} \]

in a chain of N masses

\[ N = 10 \quad N = 5 \quad N = 2 \]

Bound independent of N

Exist?
$G_N^{(i)} = f\left(G_{N-1}^{(i)}, g\right), \quad g = Y(s)/(ms)$

$\max_{N, i} \left| G_N^{(i)} \right| \leq 1$
Summary and Future Work

- **Main Focus**
  - Uniform boundedness of the transfer function from a movable point disp. to a given intermass disp. in mass chains

- **Main Results**
  - Graphical representation
  - Analytical proof

- **Future Work**
  - Design the interconnection
  - Different topology