

Title: Adaptive Mass Damper using MRE for dynamic vibration reduction of piping systems (ADMIRE Pipes)

Duration: April 2024 to March 2026

Objectives:

This project aims to systematically design, develop, fabricate, and test a prototype adaptive mass damper device using magneto rheological elastomer (MRE) to reduce the dynamic vibrations in pipes. The following are the objectives of the project

- Development of a novel mass damper device tailored to the unique dynamic characteristics of piping systems.
- Fabrication of prototypes of the mass damper device based on the design and analysis outcomes.
- Comprehensive experimental and numerical analysis of the vibration patterns and frequencies specific to piping components.
- Validation of the prototypes in controlled laboratory environments to evaluate their effectiveness in reducing vibrations across different operating conditions

Progress Highlights:

- ❖ Identification & Design of novel mass damper device with its components using FE studies
- ❖ Modular device components suitable for varying frequency ranges
- ❖ Isotropic MRE using RTV-based silicone
- ❖ Fabrication of TMD and components

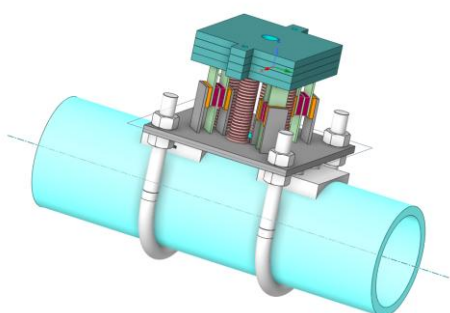


Figure 1 Proposed Scheme for MRE based adaptive damper for piping system

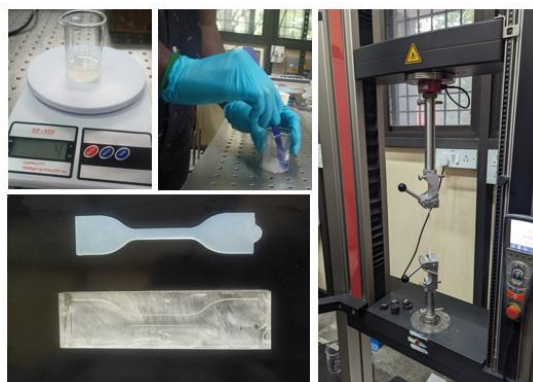


Figure 2 Synthesis and static characterization of RTV based MRE

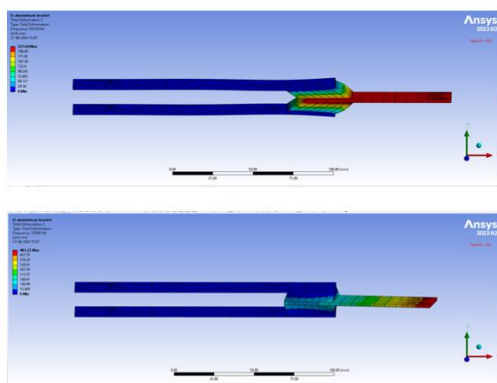


Figure 3 FE Modal Analysis of the elastomer (shear & torsion mode)

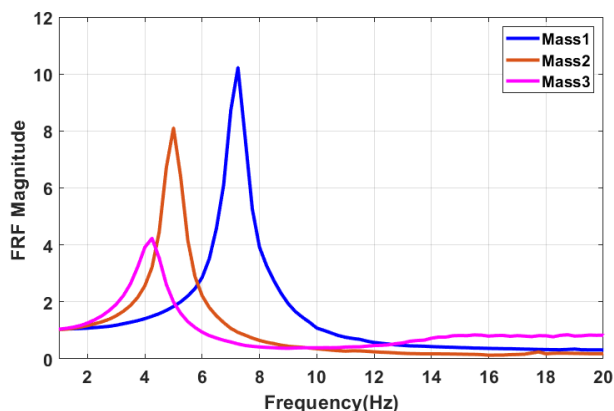


Figure 4 Experimental frequency response of TMD device

Future Programme:

- Experimental characterization of MRE components
- Experimental characterization of TMD and adaptive damper device
- Numerical studies on the primary system (piping component)

PI and Co-PI

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