

申报奖项：辽宁省建设科学技术奖——辽宁省建设青年科技奖

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项目简介：大跨桥梁、高层建筑、高耸能源设施等低频密频结构是国家重要基础设施，其安全服役对经济可持续发展至关重要。申请人揭示了基于能量重构和惯容辅助的自适应调谐减振机制，提出了基于分级耗能和频率-力反馈的自适应调谐减振技术，建立了基于动力解耦和模型降阶的调谐减振评估与优化方法。

代表性论著：

1. Hao-Long Tang; Jun Dai*; Zhao-Dong Xu; A novel two-state active tuned mass damper inerter control of high-flexibility long-span bridges, *Mechanical Systems and Signal Processing*, 2026, 258: 114700
2. Pan-Pan Gai; Jun Dai*; Zhao-Dong Xu; Qin-Sheng Bi; Qing-Song Guan; A novel two-state active tuned mass damper inerter control of high-flexibility long-span bridges, *Journal of Structural Engineering-ASCE*, 2025, 151(11): 05025005
3. Jun Dai; Cen Yang; Pan-Pan Gai; Zhao-Dong Xu; Xiao Yan; Wen-Peng Xu; Robust damping improvement against the vortex-induced vibration in flexible bridges using multiple tuned mass damper inerters, *Engineering Structures*, 2024, 313: 118221
4. Jun Dai; Pan-Pan Gai; Zhao-Dong Xu; Xiao Yan; Ying-Qing Guo; Xing-Huai Huang; A hybrid constitutive model of high-damping viscoelastic materials used for vibration control of civil structures, *Engineering Structures*, 2024, 304: 117648
5. Jun Dai; Zhao-Dong Xu; Pan-Pan Gai; Zhong-Wei Hu; Optimal design of tuned mass damper inerter with a Maxwell element for mitigating the vortex-induced vibration in bridges, *Mechanical Systems and Signal Processing*, 2021, 148: 107180