

## **Semi-Active Damping Of Structural Vibrations Using Controllable Truss-Frame Nodes**

**Lukasz JANKOWSKI, Błażej POPLAWSKI, Mariusz OSTROWSKI, Aleksandra JEDLIŃSKA,  
Grzegorz MIKUŁOWSKI, Bartłomiej BŁACHOWSKI, Dominik PISARSKI, Rafal  
WISZOWATY, Arkadiusz MROZ, Jan HOLNICKI-SZULC**

This contribution reviews a recently proposed semi-active control approach based on the Prestress-Accumulation Release strategy, which aims at damping of structural vibrations by promoting vibration energy transfer from lower- into higher-order modes that have significant material damping. Unlike typical semi-active control, which focuses on local dissipation in actuators, the aim is to trigger natural global damping mechanisms. The actuators are controllable truss-frame nodes: lockable hinges that can change their mode of operation from a frame node (locked hinge) into truss node (free rotation). Sudden removal of such a kinematic constraint releases the accumulated bending energy into high-frequency quickly damped local vibrations. Two formulations are reviewed: decentralized with local-only feedback, and global, which aims at a targeted energy transfer between specific modes. Experimental results confirm the effectiveness using free, forced harmonic and random vibrations.