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(57) Abstract :
ADVANCED EARTHQUAKE-RESISTANT BUILDING DESIGN WITH SHAPE MEMORY ALLOYS ABSTRACT The invention discloses a seismic-responsive damping system for buildings, featuring strategically positioned dampers incorporating shape memory alloys (SMAs). The SMAs enable controlled deformation in response to seismic forces, enhancing the building's seismic resilience. The dampers dissipate seismic energy through reversible phase transformations of the SMAs, ensuring multiple cycles of deformation and recovery without permanent damage. The system includes a control system for real-time adjustments based on seismic conditions. Additionally, a retrofitting method utilizes retrofitting components with SMAs to enhance seismic resistance in existing buildings. The components are strategically integrated, configured for reversible phase transformations, and optimized for energy absorption. An earthquake-resistant building design system incorporates a computer-implemented tool, a database of SMA properties, and algorithms for optimized SMA placement. The system facilitates tailored earthquake-resistant designs, allowing simulations and customization based on specific project requirements.

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