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Fiber-Confined Elastomeric Isolators (FCEIs) for Multi-Directional Vibration Control of Structures

Fiber-wrapped pads deflect horizontal/vertical seismic energy to protect buildings cost-effectively.

Purdue researchers, in collaboration with researchers from Indian Institute of Technology Delhi, India have developed a seismic base isolator termed "Fiber-Confined Elastomeric Isolator (FCEI)" for use in deflecting and absorbing seismic energy. The developed technology is designed to protect structures from earthquake-induced vibrations by isolating both horizontal and vertical seismic forces. This isolator system utilizes a single elastomeric pad wrapped or confined with multiple layers of fiber fabric or fiber ropes. Unlike conventional seismic isolators that use laminated layers of elastomers and steel reinforcements, the FCEI's fiber confinements prevent bulging and tearing of the rubber pad without increasing the isolator's stiffness. This provides improved flexibility to the isolator, allowing it to effectively absorb and deflect seismic energy, thus minimizing damage to buildings, bridges, and other structures during earthquakes. The technology can allow contractors, structural designers, and others to reduce the vibration response and protect structural inhabitants in addition to nonstructural components of the structure. The structure can be applied in new construction and also in retrofits.

Technology Validation:

-Schematics demonstrate the isolator's ability to absorb and deflect seismic energy through the elastomeric pad's nonlinear restoring force characteristic

-Uses fiber confinements to control bulging and tearing of the elastomeric pad under vertical and horizontal loads

Advantages:

-Cost-effective and readily available materials for constructing isolators

-Effective vibration isolation in vertical and horizontal directions

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Category
Chemicals & Advanced Materials/Polymer Science & Smart Materials

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View online

-Lightweight

Applications:

-Commercial construction and infrastructure

-Retrofitting buildings and infrastructure

-Building earthquake protection

TRL: 4

Intellectual Property:

Provisional-Patent, N/A, United States

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