Eunsoo Choi et al., J Civil Environ Eng 2015, 5:5
http://dx.doi.org/10.4172/2165-784X.C1.002

OMICS International
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World Congress and Exhibition on
Construction & Steel Structure
November 16-18, 2015 Dubai, UAE

Behaviors of flag-shaped dampers using combination of magnetic friction and rubber springs

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This study proposes a new concept of a smart damper using the combination of magnetic friction and rubber springs. The magnet will provide energy dissipation and the rubber springs with precompression contribute to increase recentering capacity of the damper. To verify their performance, this study conducts dynamic tests of magnet frictional dampers and precompressed rubber springs. For the purpose, hexahedron Neodymium (NdFeB) magnets and polyurethane rubber cylinders are used. In the dynamic tests, loading frequency varies from 0.1 to 2.0 Hz. The magnets provide almost perfect rectangular behavior in force-deformation curve, and the frictional coefficient of the magnets is estimated through averaging and regression. The rubber springs re tested without or with precompression. The rubber springs show different loading path from the second cycle and remain residual deformation that is not recovered immediately. The rubber springs show larger rigid force with increasing precompression. Lastly, this study discusses combination of rigid-elastic behavior and friction to generate 'flag-shaped' behavior for a smart damper and suggests how to combine the magnets and the rubber springs to obtain the flag-shaped behavior. The performance of the magnets and precompressed rubber springs is verified through analytical models.

Biography

Eunsoo Choi has completed his PhD from Georgia Institute of Technology. He is an Associate Professor in Department of Civil Engineering, Hongik University. He has published more than 75 SCI papers in reputed journals.

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