# Earthquake Response Reduction Considering Nonlinear Interaction between Composite Geomaterials and Foundation

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## ABSTRACT

There are many cases in recent earthquakes that a damage to soil-foundation causes to ruin the function of the whole structure, even the damage to superstructure is small. So it is necessary to improve the aseismic capacity of soil-foundation. However, soil cement which is a general material used for reinforcement against earthquakes often exhibits brittleness with the increase in the strength, and results in decreasing the aseismic capacity. Therefore, improving this property and achieving the higher ductility of the soil cement are recognized as the important subjects.

To address these subjects, it is effective to develop an artificial soil having known mechanical properties and toughness against large deformation, then to understand the soil-foundation behavior during large earthquakes, and to enhance the aseismic capacity of the superstructure and the soil-foundation as a whole. By this way, the aseismic capacity of the structures is improved and the functions is maintained even after large earthquakes.

Focusing on the ductility of fibers and the elasticity of rubber-chips, authors have developed an artificial geomaterial compound, which is a mixture of cement, rubber-chips, and fibers and stable in a large strain region. This paper discusses the shearing mechanism and the properties of the compound based on laboratory studies, then the results of earthquake response behavior of the buildings on shaking table test, of which foundation is supported on a hard soil.

## REFERENCES

Atsushi, S., Miki, K., Hisatoshi, K., and Yuji, M. (2011). “Study on the mechanical properties of geo-material composed of soil using rubber-chips and fibrous materials”, *AIJ J. Technol. Des.*, Vol. **17**, No. **35**, 61-66. (in Japanese)

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