

# Investigation of Critical Factors for Hardin's Relative Breakage by Discrete Element Method

Zuoguang Fu<sup>1</sup>, Yuanjie Xu<sup>2,\*</sup>, Xihua Chu<sup>3</sup>

<sup>1</sup>Department of engineering mechanics, Wuhan University, Wuhan430072, zgfu1985@126.com

<sup>2</sup>Department of engineering mechanics, Wuhan University, Wuhan430072, yj\_xu@whu.edu.cn

<sup>3</sup>Department of engineering mechanics, Wuhan University, Wuhan430072, chuxh@whu.edu.cn

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**Abstract:** Particle breakage has been attracting increasing attention in such fields as powder technology, geology and geotechnical engineering. With the purpose to investigate the critical factors of Hardin's relative breakage, a numerical analysis of triaxial compression tests by discrete element method (DEM) codes was performed on Yade open source platform. Fractal dimension, uniquely determined by a certain particle-size distribution (PSD) sample with the support of fractal theory, was adopted as a simple and practical parameter to represent the range of sizes of entirely broken particles, as well as their numbers in breakage process. Then it was treated as a key factor in calculating the energy input in any state of simulation. It can be found that the relative breakage is independent of particle strength and confining pressure but closely related to the energy input. This result is in good agreement with experimental data in previous work and can be regarded as a basis for a deep discussion of relationship between the relative breakage and the energy input.

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