

# パーシステントホモロジーによる湿潤粉体成形体の弾性率に及ぼす充填構造の影響解析

(東北大多元研) 石原真吾、加納純也

(The University of Melbourne) George Franks

Adv. Pow. Tec.

Vol. 34, No. 1, 103874.

Published online: 1 December 2022

DOI: 10.1016/j.appt.2022.103874

## Effect of particle packing structure on the elastic modulus of wet powder compacts analyzed by persistent homology

Shingo Ishihara, George Franks, Junya Kano

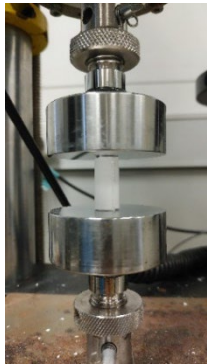


Figure1 The compression test of the cylindrical compact in the experiment.

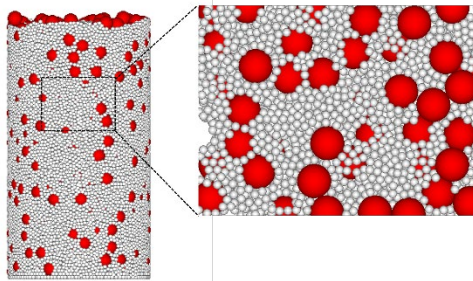


Figure2 Packing structure of different particle diameters calculated by DEM.

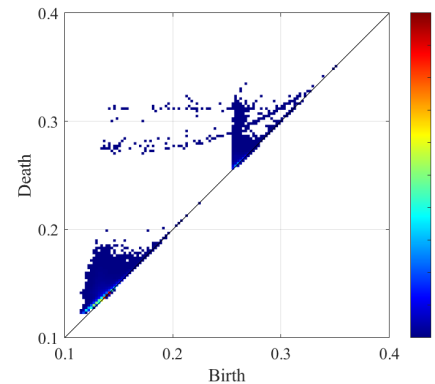


Figure3 Persistence diagram (PD) of wet powder compact.

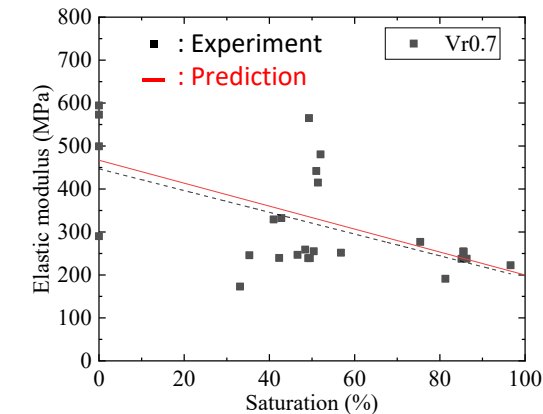


Figure4 Elastic modulus from compression experiments and prediction from proposed equation.

湿潤状態での粉体の挙動や機械的特性を把握および予測することは、自然界や産業界において重要である。固気液三相からなる湿潤粉体成形体の弾性率は、構造不均一性が要因となり予測が困難とされてきた。位相的データ解析を導入することで構造の均一性を数値化し、粉体の充填構造と弾性率の関係を明らかにすることで弾性率の予測式を提案した。

Understanding and predicting the behavior and mechanical properties of wet powders is important. The elastic modulus of wet powder compacts has been difficult to predict due to structural inhomogeneity. Persistent homology quantified the homogeneity, and an equation for prediction of elastic modulus was proposed.