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# Measuring grain displacements from X-ray tomography projections: a time-saving method.

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## Abstract

A small number of tomographic projections contain enough information to solve rigid body motions of particles in a granular material even if it does not allow for an accurate 3D image reconstruction. In this work, we present the Discrete Digital Projections Correlation method (D-DPC). This new technique aims to determine the individual grain displacements directly from the projections of the deformed state with no need of its reconstruction. Using D-DPC considerably reduces the time required to scan the sample at its deformed state and hence, allows studying faster evolutions of the sample.

The method is formulated as an inverse problem. Digital projections are generated from the reconstruction of the initial state by means of a projection model. Grain displacements are then estimated by minimizing the discrepancy between the digital projections and the acquired experimental projections.

The projection model will be presented, next to some applications of the method.

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