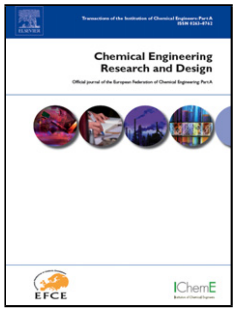

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EXPERIMENTAL DETERMINATION OF PARTICLE-PARTICLE RESTITUTION COEFFICIENT VIA DOUBLE PENDULUM METHOD

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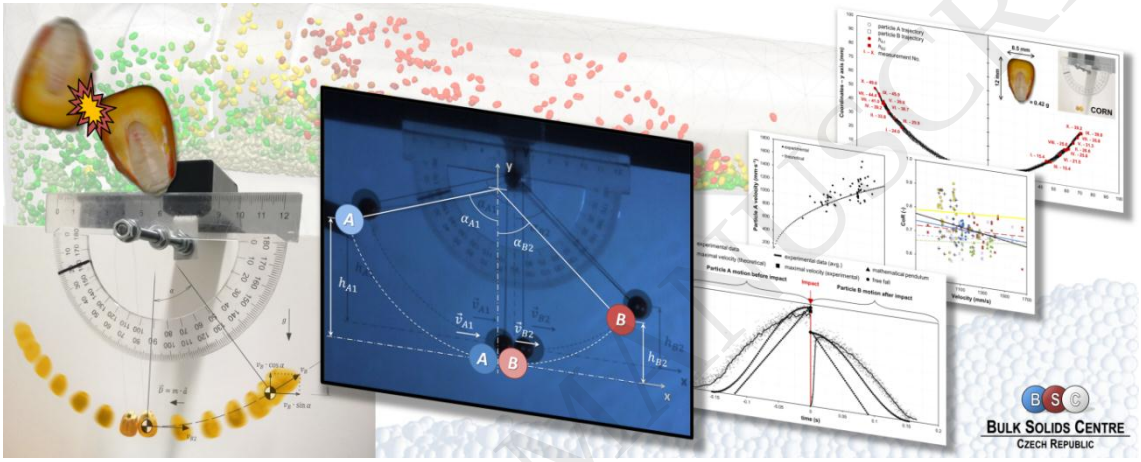
Graphical abstract



Highlights

- The paper describes an experimental determination of the coefficient of restitution of two particles.
- Three options for evaluating experiments are compared, including their results.
- The influence of the pendulum thread and the shape and size of the particles was investigated.
- The value of the coefficient of restitution of corn, wood pellets and black coal was determined.

Abstract

The coefficient of restitution *e* is determined as the ratio of the final to the initial relative velocity between two moving objects after their collision. It is also one of the basic features and parameters for contact models of the discrete element method (DEM). The virtual simulation of industrial processes using DEM modelling is currently undergoing a great development both in the ways of application and in the complexity of the individual models. Therefore, input values need to be constantly refined to ensure the quality outputs of these numerical models. This article describes an experimental method of measuring the coefficient of restitution of two particles by means of a double pendulum, which presents a number of problems especially for non-spherical particles. At the same time, this article presents three options for evaluating the proposed experiment, including their comparison and description of their pros and cons. A series of experiments with particles of different sizes, shapes and materials was performed and their coefficients of restitution were determined. The presented method allows to be used on a broad scale especially for spherical particles of > 5 mm, the coefficient of restitution can be determined very accurately. To some degree, this applies to non-spherical particles of mass in tens of grams and of different materials as well. Their initial coefficient of restitution can be determined with a high degree of precision, which is important for using in contact models definition. The accuracy of the contact model is dependent on accurate specification of restitution coefficient. In