

## **Experimental and numerical study of effect of the geometrical and material parameters on mechanical strength of agglomerates produced by compaction of granular plant materials**

Agglomeration (granulation) is the process of size enlargement of particulate solids. Size enlargement through agglomeration is one of the unit operations of mechanical process engineering. Products of agglomeration in the form of tablets, briquettes et al. find a wide application in many branches of industry and knowledge of their physical properties is required for establishment of the optimal handling, storage and conveying conditions. Among components of agglomerates, plant materials constitute a significant group. The feature of plant materials which distinguishes them from mineral materials is a relationship between material parameters and environmental conditions (e.g. temperature and moisture content). Increasing application of agglomeration process in many industries results in the development of new research methods for investigating agglomerates. Experimental and analytical research methods have been used for many years to study and predict the phenomena occurring in agglomerates. The knowledge about the relationship between the mechanical properties of agglomerates and the geometrical parameters, and the arrangement of granules in samples is still insufficient, therefore, numerical simulation has emerged as an appealing technique that can help with the analysis and optimization of compaction operations.

Although a number of research projects aimed to investigation of the properties of agglomerates have been so far realized, a few issues relating these products remain still unsolved. Since there is still a major research gap concerning the mechanisms of interaction between particles in agglomerated materials of biological origin, the objective of the proposed project is experimental and numerical study of effect of the geometrical and material parameters of granules, and the process conditions on mechanical strength of agglomerates produced by compaction of granular plant materials.

Scientific supervisor: dr hab. J. Wiącek, prof. IA PAN

Qualifications required from candidate:

- Msc in physics or technical sciences
- Ability to conduct mechanical tests of materials.
- Knowledge in the field of mechanics of materials.
- Knowledge and abilities in the field of numerical modelling.
- Ability to statistical study of the test results.
- Ability to program in C++.
- Knowledge of english (at least intermediate level).