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Modeling of asphalt by means of discrete element method – an initial study

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Asphalt is a viscous material consisting of a matrix of stones, sand and filler glued together by a bituminous binder, which is used in many pavement constructions. Knowledge about asphalt is mainly based on the results of experimental and empirical investigation, which comes at the expense of conducting time-consuming and lab-costly procedures. The use of numerical models, capable of reducing greatly the testing cost, has shown great potential in characterizing asphalt-aggregate mixtures for both material evaluation and structural design purposes, [1],[2]. Discrete element method (DEM) is one type of numerical simulation method which allows the finite displacement and rotation of discrete particles, making it an excellent tool to simulate the complex micro interaction between aggregate particles within an asphalt mixture, [3],[4] . In this research, PFC3D – a commercial DEM program – will be applied. The work presented here will focus on the discrete element method as a tool for modelling composite materials, i.e. determination of a representative volume; boundary conditions; characterisation of the components mastic (binder + filler) and aggregates; and establishment of virtual test samples. Results from initial tests will be presented and the future development of the model towards characterising asphalt from its composition will be outlined.

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