Analysis of packing structure of fiber-reinforced asphalt compact

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Submission Category:

(A) Technical research proposal to solve concrete problems

SDGs Targets/Indicators:

This proposal focuses on the 9.4 and 9.5 SDGs targets about improving infrastructure and industrial processes and enhancement of industrial sectors in developing countries by upgraded scientific research methods.

Abstract:

In recent years, the question of severe climatic conditions, large temperature differences between winter and summer and the flood situation, especially in the spring flood period, has become more relevant in many areas which greatly affects the deterioration of asphalt properties. In this respect, higher quality and mechanically stronger asphalt is required. One of the essential part in construction field, asphalt concrete, has become an issue to consider how to optimize its performance. Consequently, reinforcing materials can aid to enhance the structure of concrete. It can be achieved by improving packing particles which is target-related to improve the efficiency of particles structure. Indeed, packing efficiency has become the topic of interest for many engineers, scientists and researchers in order to involve packing structure investigation into materials science. Particle-size distribution effect can influence to compact a system of atoms, molecules and molecular assemblies. Moreover, it maintains three main aims: determination of how system packs; improvement of calculations of packing density and porosity; and, lastly, estimation of how packing and its features can impact on a variety of manufacturing. One of the packing particles studies is the discrete approach whose main principle refers to maximally packing in available volume. The DEM (Discrete Element Modelling) simulations emphasize on the profitableness of technology for fulfilling voids in the structure, which corresponds to the rise of packing density. This study aims at investigating microstructural features of fiber-reinforced concrete through simulations

and numerical analysis. Especially, non-spherical shapes of particles and their compacts are the objective of this investigation. As a result, optimal parameters such as fiber diameter and length, and, importantly, volume fraction which significantly affect to packing structure and properties of material can be shown. Therefore, further research on this topic can can have positive implications in industrial area, especially construction materials production.