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Theoretical evaluation of rheological state of sand cement composite systems with polyoxyethylene additive using topological dynamics concept

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Abstract

© 2016 Trans Tech Publications, Switzerland.Presents the results of studies of contemporary materials in the field of rheological state. The topological mortar structure has been provided by theoretical evaluation of the rheological state of the cross-linked solutions and the experimental viscosity data of the sand cement mortar which has been modified by water-soluble additive – polyoxyethylene. The general model has been made for the structure of non-Newtonian liquideous systems including dilatant, pseudoplastic bodies with two main rheological active components in their structure – rigid and viscous phases. It is shown that in pseudoplastic systems, as the shear stress increases, the viscous phase grows because of the reduction of rigid phase content. In dilatant systems the converse situation has been observed. Furthermore, these phases are not clearly distinguishable, but to the contrary they are spatially interconnected in a complex way. The structure modeling has been made for non-Newtonian bodies using the Shklovskii-de Gennes model. The studies have found that the construction composite sand cement system is defined as the pseudoplastic body where cement and sand act as the rigid phase, water solution of polyoxyethylene – as the viscous phase. These findings can be used to prove the influence of polymer powder on the workability of dry mortar.

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Keywords

Contemporary materials for bulding, Dilatant fluids, Dispersion medium, Dispersion phase, Mortar viscosity, Newtonian fluids, Pseudoplastic fluids, Shear stress, Water-soluble additive polyoxyethylene