

Experimental and Theoretical Investigation of Slow Reversible Deformation of Concrete in Surface-Active Media

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Abstract : Many-year investigations of the nature of damping creep of rigid bodies and materials led to the discovery of the fundamental character of this phenomenon. It occurs only when a rigid body comes in contact with a surface-active medium (liquid or gaseous), which brings about a decrease of the free surface energy of a rigid body as a result of adsorption, chemisorption or wetting. The reversibility of the process consists of a gradual disappearance of creep deformation when the action of a surface-active medium stops. To clarify the essence of processes, a physical model is constructed by using Griffith's scheme and the well-known representation formulas of deformation origination and failure processes. The total creep deformation is caused by the formation and opening of microcracks throughout the material volume under the action of load. This supposedly happens in macroscopically homogeneous silicate and organic glasses, while in polycrystals (tuff, gypsum, steel) contacting with a surface-active medium micro crack are formed mainly on the grain boundaries. The creep of rubber is due to its swelling activated by stress. Acknowledgment: All experiments are financially supported by Shota Rustaveli National Science Foundation of Georgia. Study of Properties of Concretes (Both Ordinary and Compacted) Made of Local Building Materials and Containing Admixtures, and Their Further Introduction in Construction Operations and Road Building. DP2016_26. 22.12.2016.

Keywords : process reversibility, surface-active medium, Rebinder's effect, micro crack, creep

Conference Title : ICCCTM 2019 : International Conference on Creative Construction Technologies and Materials

Conference Location : Berlin, Germany

Conference Dates : May 21-22, 2019