

Monitoring and Diagnosis of the Process of Shrinkage and Crack Formation in Concrete Using Holographic Interferometry

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Abstract:

Concrete is the main building material for the hydro construction. Therefore, it is very important to study long-term processes, such as shrinkage, creep, swelling, temperature, and crack resistance, which affect its strength. Known methods do not fully describe these processes in materials such as concrete and reinforced concrete. In this paper, an application of holographic interferometry is considered which enables to evaluate qualitatively and quantitatively the deformation of a solid body and the processes of shrinkage, crack formation and development of concretes of different compositions. A holographic plate is exposed twice before chemical processing - for the first time when the surface of the test sample is in the initial condition, and the second time when it is deformed or undergoes any other impact. This is a unique way to simultaneously observe a unified picture of deformation on the whole registered surface of the object under studying and at the same time to measure all three components of the displacement vector at any chosen point. Experimental studies are discussed, in particular, such long-term processes as shrinkage and cracking for various fillers and various reinforcing materials. The improvement and development of research methods, as well as a broad introduction of its results in practice, which will further facilitate the reliability and durability of concrete and reinforced concrete structures, one of the major building materials in construction, in particular in hydro-technical construction. This will allow monitoring and diagnostics during dam construction.

Biography:

Giorgi Dalakishvili joins Georgian Technical University (GTU) as a Professor in the Department of Hydro Engineering on 2010. Prior attending GTU, he was a Head of Department of Management, material - technical and social base for the development at Ministry of Education and Science of Georgia. Up to 1996 he was Head of Department at Institute of Structural Mechanics and Earthquake Engineering. He received her MBA from Georgian Technical University and Ph.D. from the Institute of Structural Mechanics and Earthquake Engineering of the Georgian Academy of Sciences. He has developed new courses as a Professor at GTU. His primary research interests are in the field of Holographic Interferometry and its applications in monitoring and diagnosis of the process of shrinkage and crack formation in concrete. He was a scientific head of some magister and doctoral thesis's. Specifically, he is interested in student experimental works, as well as pedagogies. In his free time, he enjoys traveling.