THE MODULUS OF ELASTICITY AND DAMPING CHARACTERISTICS OF THE GLASS-FIBRE REINFORCED CONCRETE

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The modulus of elasticity and internal loss factor are important and useful quantities for studies of mechanical behaviour of composite materials. The Glass-fibre Reinforced Concrete (GRC) is a perspective material for the construction of noise barriers. In this paper, the experimental equipment and results of the measurement of these factors for several technology procedures of GRC used in noise barriers will be presented.

Key words: *modulus of elasticity, loss factor, glass-fibre reinforced concrete*

1. Introduction

The Glass-fibre Reinforced Concrete (GRC) is a fine-grained concrete with matrix from Portland cement, fine silica sand and other admixtures depending on the utilisation in particular applications. The alkaline resistant glass fibres are applied as reinforcement. The alkaline resistance of the glass fibres is due to their high content of ZrO_2 in the range of 17 % to 19 %. The diameter of glass fibres used in this study is about 13 μm to 15 μm. The orientation of the glass fibres in matrix is omni directional. The applied reinforcement enables production of parts with maximum thickness of 10 mm. The thin-walled plates have a broad application in building industry. With respect to propitious mass to strength relation, good resistance to weather conditions and long lifetime, the GRC materials can be also effectively used for the construction of noise barriers along traffic communications.

Air-borne sound insulation of barrier depends on the density, flexural rigidity (dynamic elastic bending modulus) and on the internal damping (loss factor) of the structural parts. A lot of methods exist for measurement of these characteristics. Selection of the most suitable method, and requirements on instrumentation depend on the frequency range, the technique of stimulation and detection of vibrations, and on temperature range and dimensions of test specimens. The technique of stimulation and detection of vibrations comes out from measured characteristics and depends used measurement facilities. The high accuracy is desirable for measurement of absolute values of measured quantities. Monitoring of relative changes of measured characteristics requires very sensitive method. As to satisfy these requirements, we used the resonance method with electromagnetic stimulation and detection of the vibrations for measurement of the elastic modulus and dumping characteristics of the CRG, [1]. Suitable equipment for measurement of vibrations of single-sided and double-sided specimen clamping was designed and manufactured in our laboratory.

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