$$u_A(x,t) \approx c_1 (T-t)^{\frac{1}{1-\beta}} \left(a - \left(\frac{|x|}{\tau^{\frac{1}{p}}} \right)^{\frac{p}{p-1}} \right)^{\frac{(p-1)(k(p-2)-m+1)}{k(p-2)(k(p-2)+\alpha)+m-1}} \left(1+o(1)\right)$$

at $|x| \to a^{\frac{p-1}{p}} \tau^{\frac{1}{p}}$ where constant c_1.

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ON ONE METHOD FOR CALCULATING MULTI-LAYER SOUND INSULATION INCLUDING LAYERS OF A FIBROUS POROUS MATERIAL

[1]A. Omonov, [2]Kh. Imomnazarov

[1]Tashkent State Economic University, [2]Institute of Computational Mathematics and Mathematical Geophysics SB RAS, Novosibirsk

The sound-insulating effect of a layer of a fibrous porous material combined with a multilayer sound insulation is due to physical processes associated, in the general case, with the formation of two types of elastic vibrations. The first of them is fluctuations in the air volume filling the pore space; the second is the vibrations of a fibrous structure that forms the material as it is and, respectively, the porous skeleton of the layer. The degree of the relative influence of each of the noted modes of vibrations substantially depends both on the physical properties of the porous medium of the layer and on the method of its inclusion in the composition of multilayer sound insulation [1].

When modeling the wave processes in liquid-saturated porous media, a model of the Frenkel-Biot type [2, 3] is used, which is a linear two-phase model of the medium. In this model, in addition to the known types of longitudinal and transverse waves in liquids and solids, a second longitudinal wave arises, which is caused by differences in the elastic characteristics of the solid and liquid phases. In [4], a nonlinear mathematical model was proposed for describing wave processes in a porous medium saturated with a liquid. The model is based on general physical principles: the fulfillment of conservation laws, the first law of thermodynamics and Galileo's principle of relativity. In this case, to describe dissipative processes, the fulfillment of Darcy's law is not required.

This study proposes an algorithm for modeling the acoustic properties of a layer of a fibrous porous material as part of a multilayer structure by a transfer matrix of a linear quadrupole connecting the pressure and normal velocity components in the inlet and outlet sections of the layer. The specificity of such a representation consists in the dependence of the properties of the matrix on the type of insulation layers directly adjacent to it. Nevertheless, the invariance of these properties with respect to the characteristics of the remaining layers of the structure makes a set of such matrices a fairly universal tool applicable in the standard calculation of the multilayer sound insulation, whose all elements are characterized by second order matrices.

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