Abstract

The purpose of the work was to develop a mathematical model of fire spreading in a three-story building during full-scale fire-response tests; research of accuracy and reliability of parameters of temperature modes of fire in separate premises of the building. The Pyrosim computer system, a user shell for the Fire Dynamics Simulator program, was used to calculate the temperature in the models of premises under fire. A numerical experiment was conducted to model full-scale tests of premises with fire in a three-story building using computer gas-hydrodynamics methods. The nature of the fire development and the time dependences of its main parameters were revealed, which in turn allowed analyzing the adequacy of the modelling results and investigating their adequacy and accuracy. The obtained results of the research on the accuracy of modeling the full-scale tests of premises with fire in a three-story building revealed that the error, determined when comparing experimental and calculated data, was not significant. A relative error did not exceed 28%, and root-mean-square deviation did not exceed 51 °C. This means that the modeling results are adequate, which allows to use this approach for predicting the behavior of building structures in a fire under realistic conditions.

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