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COMPUTATIONAL EXPERIMENTS FOR RESEARCH OF FLOW AERODYNAMICS AND TURBULENT CHARACTERISTICS OF SOLID FUEL COMBUSTION PROCESS

Abstract. Some of the most interesting and useful from the point of view of practical application are the issues of heat and mass transfer modeling in the presence of physicochemical processes in real geometry areas. Such areas are the combustion chambers of various heat and power plants, and internal combustion engines.

Key Words: combustion chamber, boiler, burners, solid fuel, high-ash coal, numerical simulation, computational experiment.

Introduction
Currently, there is an increased interest in the study of heat and mass transfer processes in high-temperature environments in the presence of combustion therein. These processes run under conditions of strong non-isotropy and flow turbulence, multiphase environment, significant influence of nonlinear effects of thermal radiation, interphase interactions, and multiple cycles of chemical reactions occurring at that time. Such phenomena are widespread, and they play an important part in thermophysical processes and their study is an urgent task of macrophysics, combustion and explosion physics and present-day thermophysics.

Turbulent high-temperature and chemically-reactive media are exceptional in terms of their physicochemical properties, hands-on capabilities and engineering applications. Research on heat and mass transfer in such media is relevant in the creation of new physicochemical technologies, in the design of aviation and rocket technology, in the development of new furnace units, gas turbines and internal combustion engines.

Of particular relevance is the study of heat and mass transfer in high-temperature reactive media and simulation of physicochemical processes occurring during combustion of pulverized coal fuel to solve the problems of modern power engineering and ecology. Consideration of these issues is relevant in connection with the concept of "energy security" of the country, on the one hand, and the development of "clean" fuel combustion processes in compliance with strict standards for the environmental emissions of harmful substances, on the other hand.

There is an increased interest in the study of heat and mass transfer processes in the presence of physicochemical transformations, currently observed. Examination of the patterns of such flows is of fundamental importance in constructing a theory of physics of combustion and explosion and an enormous practical orientation in the creation of new physicochemical technologies and in the development of technological processes and systems with the rational utilization of energy resources.