ON THE WORKING PROCESS THEORY OF HIGH TEMPERATURE JET AND TURBOJET ENGINES IN EXPERIMENTAL ACHIVEMENTS LIGHT OF MODERN PHYSICS

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Working process theory of high temperature jet and turbojet engines demands accurate simulation for each component, including heat addition and radiation losses in combustors and turbine. Well known experience of V generation engine creation has pointed out the imperfection of modern thermodynamic working process models. The theoretically calculated in design stage engine parameters essentially differ from experimental data for first engine units. Hence, long and expensive development of new high temperature jet and gas turbine engines is required. The typical examples there are presented in [1-3].

In the first part we consider simulation of complex working processes of jet and turbojet engine different types [4]. Here the paper present the gas dynamics model for the radiation components, the close systems of thermodynamically compatible conservation laws and typical results for a turbojet engine simulation [5].

The second part of the paper demonstrates of a few experimental results of modern physics and astrophysics, which are important for high temperature engine theory development. We demonstrate solutions for cosmic jet engines, gamma-ray bursts and a black hole models.

Achievements in experimental physics and nanotechnologies pointed out also that it would be useful additionally to modification of high temperature gas turbine theory. Registration of cosmic microwave background radiation is among such achievements. The results of conducted researches indicated that frequency distribution of background radiation density corresponds to frequency distribution of radiation density from the black body with its temperature T=2.725 K (near 3 K).

The second significant achievement is the discovery of Dark Matter (DM), which is also called “the hidden mass in the Universe”. Now we know that 96% whole matter in our Universe consists of DM. The baryonic substance accounts to only 4%. There were multiple attempts to describe the nature of DM, but none was successful yet (see, in particular, [6]).

The third important success is the discovery of vacuum polarization around electrons, protons and atomic centers. Intensive light impulse propagation leads to creation of electron-positron pair at the collision of two powerful electromagnetic pulses.

Possibility to determine the shape of separate atoms and molecules via scanning probe microscopy is the fourth important for us achievement of experimental physics. It became possible to see so called van der Waals spheres and real polarized space around atomic centers.

Using emphasized achievements the more accurate simulation for nuclear, atomic and molecule structures have been considered in our paper. The equation for description of electrical potential distribution in polarized space is provided. We analyze the specific solution in polarized space of electron and proton with the presence of some barriers, which allow electrons to be on corresponding orbits of atom in stationary states. We propose the method of STationary Electrons (STEL) for atomic and molecule structures description. This model provides very forming via the linkage of stationary electrons on outer atomic orbits. Such spatial molecular structures are fully according to widely accepted physics and chemistry conception. We present also calculation results for nucleus internal structure of deuterium, tritium and helium ^{3}He and ^{4}He.

The work contains a lot of practical applications for GTE flow path designing with the use of considered approaches. The results of such calculations practically coincide with experimental data and parameters of already realized GT engine projects.

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