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Increase of efficiency and environmental safety of diesel heat-insulated combustion chamber using semitransparent ceramic coatings

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Аннотация:

The authors point out that to create a new generation of high-efficiency diesel engines with minimal impact on the environment it is necessary to involve advanced technologies of ceramic coating deposition on elements of combustion chambers of internal combustion engines. Latest publications indicate that important results achieved in developments of high-quality ceramic thermal barrier (heat-insulating) materials and coatings (TBCs). Since offered types of ceramic coatings are very numerous by the structure and diverse in characteristics, the preliminary stage of their physical characteristics research must precede an industrial tests of engine (in general also turbines) for their effective selection (in addition to traditional calculated-theoretical study). The paper examines the developed innovative experimental cycling simulator (repetitively-pulsed radiative-and-convective heating). This laboratory setup will be in demand first of all for testing of ceramic materials and coatings (TBCs) especially for substances with partial transparency (with semitransparent properties) under significant fraction of radiant components (0.1-6 MW/m2 within range 0.8-1.2 μm) of total heat flux in the combustion chambers. The authors discussed formation of temperature distributions with positive gradient in subsurface zone of the semitransparent coatings.

Ключевые слова:

18, Ceramic, Diesel, Heat-insulation, Semitransparent coating, Simulator