High-speed heating of oxidized graphite particles for their thermoexpanding in reactors of different types of feedstock loading. CFD simulation.

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The article studied in detail the process of thermally expanded graphite generation (TEG) [1] due to high-speed heating of oxidized graphite (OG) particles [2] in methane-fuelled vertical reactors.

Three types actually operating reactors served as initial data for the calculations (Fig. 1), which differ in the method of heat supply to the initial product [3]. The methane combustion process, the supplying of OG particles into the hot zone and their heating during thermal expanded are simulated (Fig. 2).

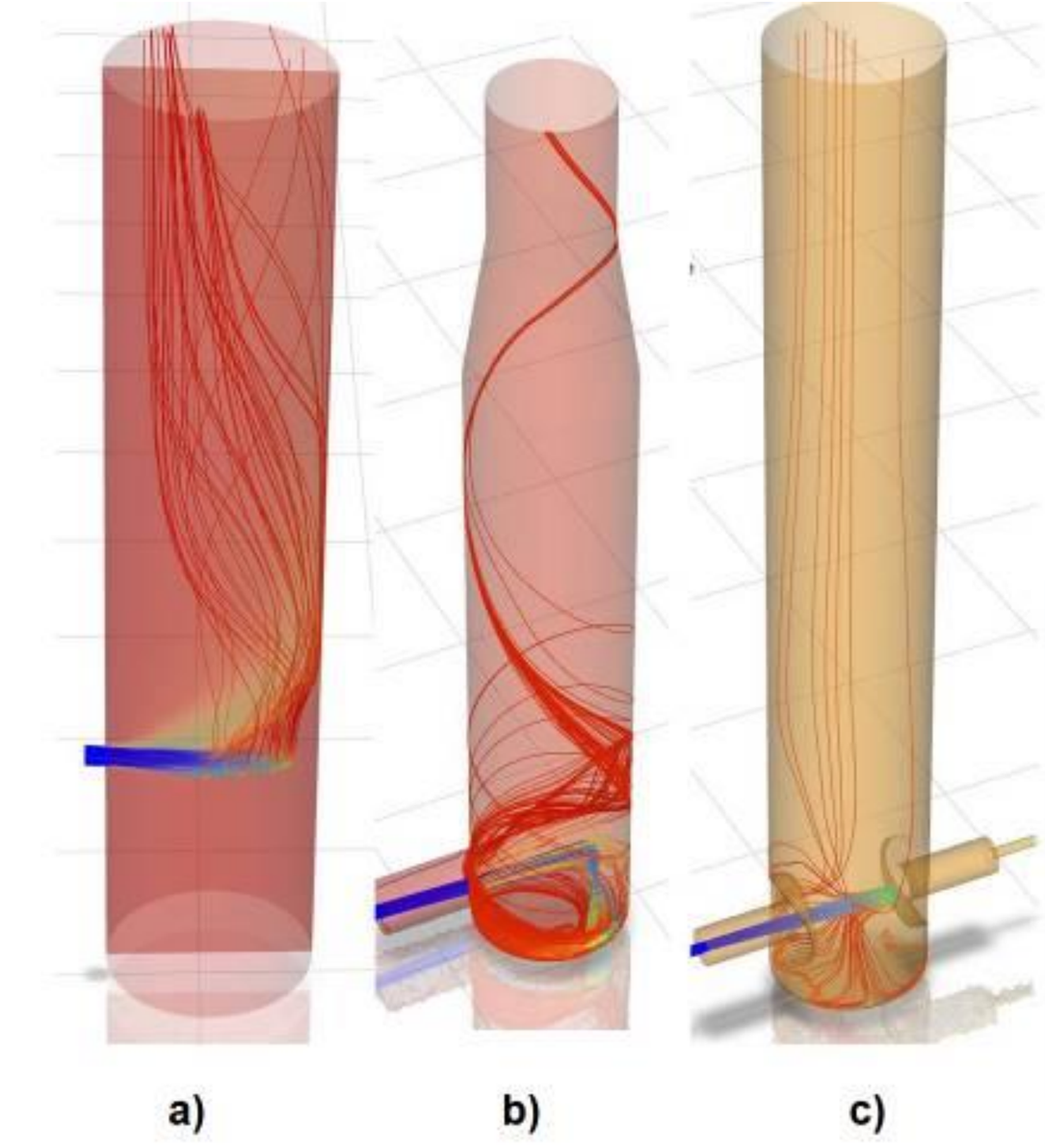

Fig. 1. Studied reactors are: a) co-flow, b) cyclone type, c) opposed type.

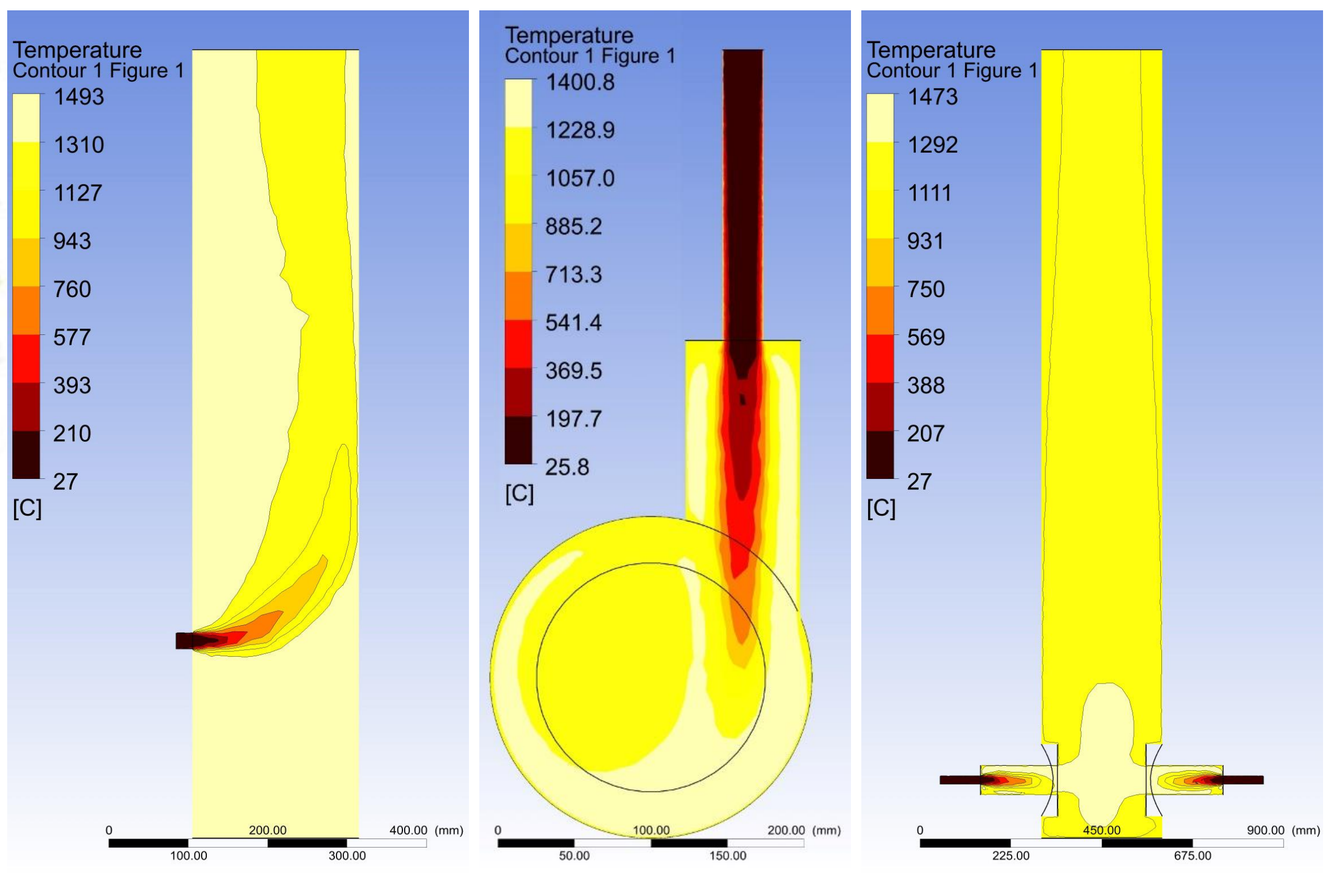

Fig. 2. Temperature distribution in the studied reactors during methane combustion.

In the process of fuel combustion, specific turbulence arises, which in turn determines the intensity of heating of the particles under study. Particles, upon reaching a certain temperature, "explosively" increase significantly. Thus, they are quickly taken out of the hot zone. As a result, the particle heating rates for these reactors types were obtained (Fig. 3) and their technological features were analyzed.

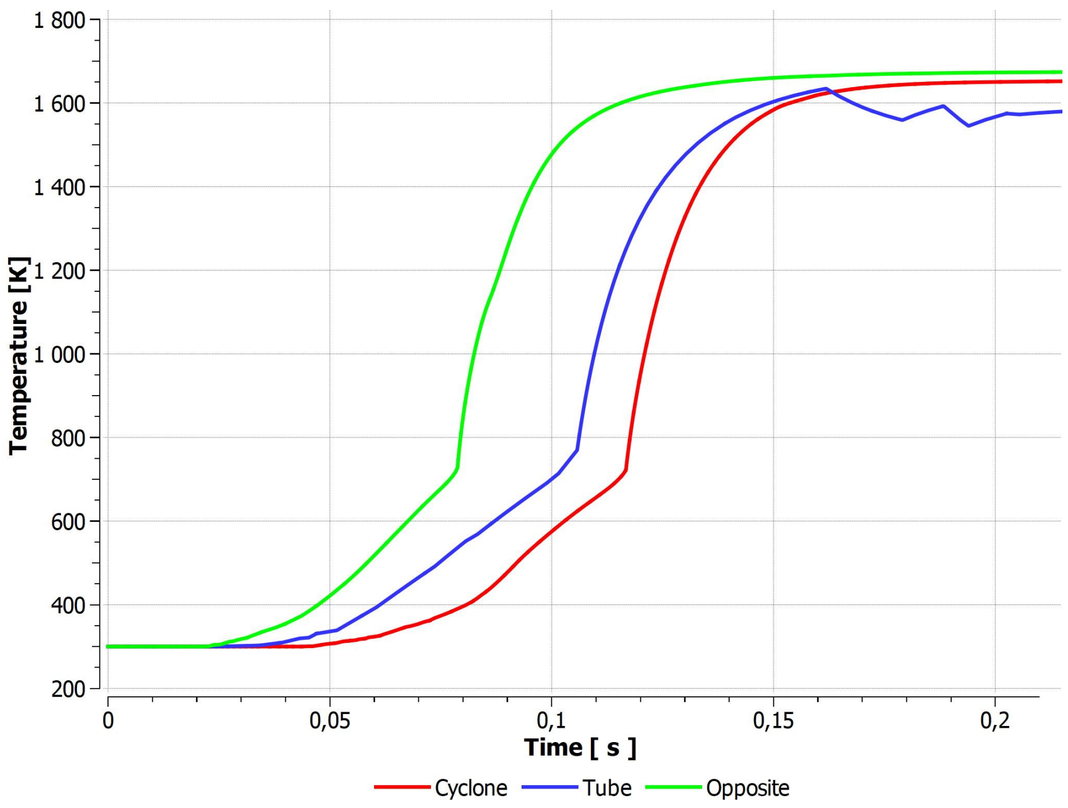

Fig. 3. Particle heating rate in the reactors under study.

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