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EXPERIMENTAL MODELLING OF SPRUCE NEEDLES IGNITION BY THE CARBONACEOUS HEATED UP TO HIGH TEMPERATURES PARTICLE

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Forest fires occur as a result of natural and man-made causes. It is known that particles heated to high temperatures are a common source of high temperature. The purpose of the work is the physical simulation of the typical forest fuel ignition (spruce needles ignition) by the carbon particle heated to high temperatures and the identification of the typical forest fuel ignition conditions. Every year, field observations and collection of forest fuel samples for experimental studies are carried out in Timiryazevskiy forestry of Tomsk Region. A typical forest fuel (spruce needles) is considered. The sources of heating during the ignition of forest fuel were simulated by the particles made of graphite in the shape of a parallelepiped with characteristic dimensions in three coordinate directions (14 mm, 8 mm, 8 mm). The weight of such a graphite particle was 1.3 g. Experiments were performed in the range of changes in initial temperatures T_0 from 1113 K to 1273 K. Numerical analysis shows that at a low sedimentation height, the particle retains its heat content to the maximum, cooling only in the near-surface layers. Initially, the mechanism of ignition as a result of the action of a burning graphite particle was investigated. The physical mechanism of the forest fuel layer ignition is established when a carbon particle heated to high temperatures falls out in a flameless mode. A series of experiments was carried out and the dependence of the ignition delay on the initial temperature of the particle was obtained. The analysis showed that the dependence of the ignition delay on the initial temperature of a particle can be approximated to a first approximation by a straight line. The obtained results can be used for the development and verification of mathematical models to simulate ignition of forest fuel by the particle heated to high temperatures.

Key words: *forest fuel, mechanism, experimental modelling, ignition delay, particle, spruce*

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