FUNCTIONAL DESIGN OF OPTICAL SMOKE SIGNALING DEVICE BASED ON TYNDALL EFFECT

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Abstract

The study focuses on the optical signaling device being developed for selective detection of smoke or dust particles in inhomogeneous media (suspended matter in air). The work of the sensor is based on Tyndall effect, which, depending on the diameter of the particle, determines its belonging to a particular type. We constructed a mathematical model for describing the operation of the device by means of Mie theory, i.e we calculated the scattering indicatrix for particles of different diameters. As a result of the analysis of the mathematical model, a functional diagram of the optical signaling device was developed. According to the functional design, the operating principle of the device being developed was determined as well. Finally, we obtained the main characteristics necessary for the light-energy calculation and the future implementation of the device.

Keywords

Smoke detector, Tyndall effect, Mie theory, light scattering

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