RANKING OF GASEOUS FUEL–AIR MIXTURES ACCORDING TO THEIR DETONABILITY USING A STANDARD PULSED DETONATION TUBE

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Abstract: The previously proposed new experimental method for evaluating the detonability of fuel–air mixtures based on measuring the detonation run-up distance and/or time in a standard pulsed detonation tube was applied to rank gaseous fuel–air mixtures by their detonability under essentially identical thermodynamic and gasdynamic conditions. In the experiments, fuel–air mixtures of various compositions based on hydrogen, acetylene, ethylene, propylene, propane-butane, n-pentane, and natural gas were used: from extremely fuel-lean to extremely fuel-rich compositions at normal temperature and pressure. The concept of "equivalent" fuel–air mixtures exhibiting the same or similar detonability under the same conditions is proposed. "Equivalent" fuel–air mixtures can be used for predictive physical modeling of explosion processes involving air mixtures of other fuels and compositions.

Keywords: fuel–air mixtures; detonability; standard pulsed detonation tube; deflagration-to-detonation transition

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