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Detonation Initiation by Gradient Mechanism in Propane–Oxygen and Propane–Air Mixtures ALEKSANDR RAKITIN, ILYA POPOV, ANDREY STARIKOVSKIY, Princeton University, NEQLAB TEAM — An experimental study of detonation initiation by high–voltage nanosecond gas discharge has been performed in smooth detonation tubes. A gradient mechanism was used to initiate detonations in stoichiometric propane–oxygen mixtures with different nitrogen dilution and in propane–air mixtures. Initial pressures from 0.2 to 1bar have been tested. Detonation was formed within 4 transverse tube sizes at initial pressures higher than 0.2 bar for the propane–oxygen mixture and higher than 0.8 bar for the diluted mixture with 40% of nitrogen. The discharge energy inputs were 0.2–0.3 J. The gradient mechanism of detonation formation similar to the one suggested by Zeldovich has been shown to be the governing process. For the mixture with air, a detonation tube with an annular discharge chamber has been designed and tested.

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