Comparing the Influence of Propane and n-Heptane Addition on Methane Ignition at High Pressure

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Introduction
In a theoretical study, the influence on the ignition delay time of propane and n-heptane addition to a mixture of methane and air at a pressure value of 60 bar was investigated. Increasing the propane content in a methane-propane mixture leads to a decrease of the ignition delay time, but at the same time the formation of a negative temperature coefficient (NTC) region [1] can be observed. Using n-heptane instead of propane, a lower amount of additive is necessary to gain a similar ignition delay time reduction over a certain temperature range. This is the basis to optimise the gas composition.

Methodology
The ignition properties of a methane-air mixture was modified by the addition of propane and n-heptane, respectively. This theoretical investigation was performed with the software LOGEsoft v1.08 by using the recently released and very detailed n-heptane mechanism by Zhang et al. [2] with 1268 species and 5336 reactions.

Results
By doping the methane-air mixture with hydrocarbons with a higher carbon number, a reduction of the ignition delay time can be achieved. Due to the fact that compared to propane already a small amount of n-heptane is sufficient for reducing the ignition delay time significantly,

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References

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