

عنوان مقاله:

Mechanism reduction process using DRGEP method for simulating the combustion in an n-heptane fueled HCCI engine

محل انتشار:

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خلاصه مقاله:

HCCI engines with low pollution and fuel consumption have been studied by many researchers in recent years. Although detailed mechanisms can better predict the properties of HCCI combustion, but if they are used simultaneously with more accurate combustion models, the computational time will increase considerably, and therefore developing of reduced mechanisms will become necessary. In the current study, a pre-developed single-zone model for an n-heptane fueled HCCI engine was used as a base for mechanism reduction. In order to decrease the computational time, use of the methods based on direct elimination of the species rather than the reactions was concerned. The studies showed that the DRGEP method is able to reduce the size of chemical reaction mechanisms significantly in a short time, therefore it was employed in the current study. In addition, instead of the traditional single-stage approach, a new approach based on gradual reduction with error control was used. Using this approach, the mechanism reduction process was performed automatically in a wide interval of the engine operative conditions. At the end of the process, the size of Golovitchev's mechanism was reduced from 57 species and 290 reactions to 42 species and 146 reactions, while the errors produced by reduction were below 1 percent.

کلمات کلیدی:

mechanism reduction, DRGEP, HCCI engine, n-heptane, single-zone model

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