

Combustion Control

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Engine combustion takes place during an extremely short time period in the millisecond range and repeats 10-100 times per second. To complicate things, both initial conditions and boundary conditions are to a large extent unknown and time varying. The task of combustion control is to make sure that the combustion behaves according to specifications despite these difficult circumstances.

Sensing and actuation is at the heart of combustion control. In-cylinder sensing, of e.g. cylinder pressure and ion current, together with models can provide essential information about the combustion performance. In-cylinder actuation, e.g. fuel injection and variable valve actuation, provides the means to compensate for deviations in the combustion performance.

Control theory combines sensing and actuation into a control strategy that maintains desired combustion performance, efficiency and emissions in the presence of disturbances. Low temperature combustion concepts have shown to be particularly demanding in terms of combustion control. Other challenges that can be addressed with combustion control are transients, fuel variations, cold start emissions and other off-design operation.

