IN-CYLINDER PRESSURE ESTIMATION FROM INSTANTANEOUS ENGINE SPEED

Daniel Brand [(a)]

[(a)] Measurement and Control Laboratory IMRT/ETHZ, Sonneggstrasse 3, CH-8092 Zürich

The instantaneous in-cylinder pressure is the key to control performance, emissions, and driveability of an internal combustion engine. Since direct measurement in production type engines is not feasible, effort has been taken to sense the in-cylinder pressure via instantaneous crankshaft rotational velocity.

In this work, the author proposes a new method to estimate the in-cylinder pressure in real time. The proposed method incorporates a combustion model, whose parameters are updated using information extracted from the signal of the pick up sensor at the engine's flywheel.
The model has been compared to real data measured from a 3.2 liter 6-cylinder spark-ignition engine. The results demonstrate the method's capability to update the model parameters, such that accurate in-cylinder pressure estimations are possible even under the influence of unknown disturbances.

Based on the estimated pressure, misfire detection, NO emission prediction, and indicated torque estimation is possible.