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Kolloquium für Mechanik

Referee: **Prof. Federico Millo**
University of Turin, Italy

Date: Thursday, July 12, 2018
Time: 15:45 h
Location: 10.81, HS 62 (R 153)

Title: **Numerical Investigation on the Effects of Different Thermal Insulation Strategies for a Passenger Car Diesel Engine**
Sabino Caputo and Federico Millo, Politecnico di Torino,
Giancarlo Cifali and Francesco Concetto Pesce, General Motors Global Propulsion Systems

Abstract

One of the key technologies for the improvement of the diesel engine thermal efficiency is the reduction of the engine heat transfer through the thermal insulation of the combustion chamber. This paper presents a numerical investigation on the effects of the combustion chamber insulation on the heat transfer, thermal efficiency and exhaust temperatures of a 1.6 l passenger car, turbo-charged diesel engine. First, the complete insulation of the engine components, like pistons, liner, firedeck and valves, has been simulated. This analysis has showed that the piston is the component with the greatest potential for the in-cylinder heat transfer reduction and for Brake Specific Fuel Consumption (BSFC) reduction, followed by firedeck, liner and valves. Afterwards, the study has been focused on the impact of different piston Thermal Barrier Coatings (TBCs) on heat transfer, performance and wall temperatures. This analysis has been performed using a 1-D engine simulation code coupled with a lumped mass thermal model, representing the engine structure. A time-periodic wall conduction model has been used to calculate the wall temperature swings along the combustion chamber surface and within the engine cycle. Two different TBC materials, Yttria-Partially Stabilized Zirconia (Y-PSZ) and anodized aluminum, and different layer thicknesses have been simulated.

References:
Caputo, S., Millo, F., Cifali, G., and Pesce, F., "Numerical Investigation on the Effects of Different Thermal Insulation Strategies for a Passenger Car Diesel Engine," SAE Int. J. Engines 10(4):2017, doi:10.4271/2017-24-0021.

Alle Interessenten sind herzlich eingeladen.

Prof. Dr.-Ing. Thomas Böhlke