

ABSTRACT

This paper introduces a novel design of an internal combustion engine heat transfer model within a comprehensive simulation environment. The modelling is based on a lumped mass parameters approach. The paper discusses an approach for a heat transfer model, implemented in MATLAB/SIMULINK, the coupling process and the physical interface. The methodology of implementing this model in a comprehensive simulation environment is presented. The calculation of the combustion process and the inner circuits for the water and oil loops, considered as boundary conditions for the Heat Transfer Model are performed using the 1D engine cycle simulation program BOOST i.e. the 1D cooling simulation program KULLI. This results in a scalable and modular structure of the model, which in turn permits a flexible design of different engine types. In order to carry out a comprehensive thermal calculation, a coupled simulation with these three different models is performed. With the proposed approach it is possible to simulate the time-dependent warm-up behaviour of the engine and the cooling system.