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Sommario/riassunto	<p>Long description: In order to fulfil future emissions legislations, new combustion systems are to be investigated. One way of improving exhaust emissions is the application of multiple injection strategies and conventional or partially premixed combustion conditions to a Diesel engine. The application of numerical techniques as CFD supports and improves the quality of engine developments. Unfortunately, current spray and combustion models are not accurate enough to simulate multiple injection systems, being in this way a topic of research. The goal of this study was the development of a novel simulation method for the investigation of Diesel engines operated with multiple injection strategies and different combustion modes. The first part of this work focused in improving the spray modelling. The information of 3D CFD simulations of the injector nozzle was introduced in the spray simulation as boundary conditions developing coupling subroutines for this issue. The atomisation modelling was also improved using validated presumed droplet size distributions. Moreover, to avoid the simulation of the injector nozzle for every investigated operating point, a novel interpolating tool was developed in order to create spray boundary conditions based on few 3D CFD simulations of the nozzle under certain initial and boundary conditions. The second part of this thesis dealt with the combustion modelling of Diesel engines. For this</p>

issue, a laminar flamelet approach called Representative Interactive Flamelet model (RIF) was selected and implemented. Afterwards, an extended combustion model based on RIF was developed in order to take into account multiple injection strategies. Finally, this new model was validated with a wide range of operating points: applying multiple injection strategies under conventional and partially premixed combustion conditions.
