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THREE DIMENSIONAL CFD SIMULATION OF A TURBOCHARGER TURBINE FOR MOTORSPORT APPLICATIONS

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Abstract:

This master thesis work has been conducted at the research institute for automotive engineering and engine technology Stuttgart (FKFS), with the virtual engine development team. Its main purpose is to give the customers of projects and advanced analysis solutions, through 3D-CFD tools.
Nowadays, the computational fluid dynamic applied to the optimisation of engines have arose a leading role in the thermal design of powertrain systems, to compare different layout solutions with reduced prototyping costs. These kinds of simulations are in facts very required, since they can interact with the testing and prototyping steps and sustain them. To complete the versatility of these tools, the 3D-CFD codes can interact with other simulation approaches. For example, it?s possible to set a complex and detailed three dimensional flow simulation with quite reliable data resulting from a real time or 1D-CFD analysis. These last mentioned models are for sure more flexible in time calculation, but they only provide signals or the mean values of thermal parameters in one spatial coordinate of the system volume.
This work aim was to insert in this scenario the basis for the three dimensional fluid dynamic simulation of a turbocharger for motorsport application, starting from the turbine component. Several steps in building the model are normally required, nevertheless bringing to its most reliable behaviour aligned to the calibration values. The work abstracts are exposed along the following chapters in a structured and methodical way, towards the most understanding and precise improvement explanation, as well as inspire further development steps.

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