Customized developments for AUDI's OpenFOAM processes

Richard Borris

Audi AG, I/EK-412, 85045 Ingolstadt, +49 841 89-573164, richard.borris@t-online.de

As a member of the VW group AUDI is using OpenFOAM for highly standardized CFD simulations in underhood air flow, climatisation and external aerodynamics. In the future the importance of virtual vehicle development, allowing for a reduced number of prototypes and less testing, will grow. The number of simulations will continue to increase, therefore it is important to provide the CFD users with easy-to-use, robust and time-efficient processes.

OpenFOAM was chosen for reasons of cost-efficiency, transparency, competitiveness and a high capability for customizations and adaptions to the specific needs of CFD applications within the VW group.

It is shown how AUDI works with OpenFOAM, using the inhouse-developed setup-tool vwgsetup. Recent developments demonstrate how the CFD processes could be improved in terms of stability, accuracy and turn-around time.

Future developments in the code will have to cover several technical and processual fields with a major focus on

- multi-physics applications (for filling processes, underhood air flow with heat transfer)
- Simulation of the air flow around and through turning wheels and tires, driven by the new WLTP standard for emission testing
- Integration of the adjoint method to generate aerodynamic sensitivity maps
- Enhanced documentation of functionalities in the code

Open FOAM has to proof it's advantages in all of these fields.

Ideally these development activities will be realized with competent partners out of the OpenFOAM community, which require a good mix of cooperation and competition between these parties. A strong and diverse community is an important success factor for the future of OpenFOAM at AUDI and in the VW group.