

Adjoint Solver Advances, Tailored to Automotive Applications

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Icon's contribution in the FlowHead project was to tailor the existing adjoint solver in OPENFOAM®* in order to make it suitable for a range of large scale automotive applications. Various cost functions were added and validated as well as a differentiated turbulence model. The solver was calibrated and tuned towards robustness and stability for real industrial cases. A guide for best practices was published for the FlowHead partners identifying issues of the adjoint solver and ways to overcome them. Results of optimisation cases show that the optimisation workflow can reduce the cost function effectively in various cases.

Further to the FlowHead work Icon has invested in developing their in-house adjoint processes to suit the needs of their customer base. A fully automated process called adjoint subcase was developed in order to allow the user to easily setup a case where the flow on the complete geometry is simulated while only a part of the geometry is optimised. This way it can be ensured that the flow on the interfaces with the optimisation subcase is properly defined. Examples of this methodology are presented.

*OPENFOAM® is a registered trademark of SGI corp.