

## Turbulent Effects in Type4 Shock Interactions

**Josef Ballmann**, F. Bramkamp, B.U. Reinartz, J. van Keuk

*RWTH Aachen, Germany*

Type4 shock interactions in hypervelocity flows are investigated numerically using two different codes: The well-known structured DLR FLOWer-code extended by different upwind formulations and non-equilibrium chemistry as well as the new flow solver QUADFLOW, which is an unstructured code with grid adaptation controlled by multi-scale analysis. Main focus of the paper is the correct prediction of the high heat loads for the contour caused by Type4 shock interactions compared with experimental data. In previous works assuming laminar flow the numerically predicted heat flux was always lower than experimentally observed. So in this paper the influence of turbulent effects on the heat flux is investigated. Furthermore, the possible improvements using the adaptive flow solver on the one hand and considering of chemical non-equilibrium on the other hand on the quality of the results is assessed.

[View the extended summary](#)