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The High Enthalpy Shock Tunnel Göttingen of the German Aerospace Center (DLR)

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Abstract

The High Enthalpy Shock Tunnel Göttingen (HEG) of the German Aerospace Center (DLR) is one of the major European hypersonic test facilities. It was commissioned for use in 1991 and was utilized since then extensively in a large number of national and international space and hypersonic flight projects. Originally, the facility was designed for the investigation of the influence of high temperature effects such as chemical and thermal relaxation on the aerothermodynamics of entry or re-entry space vehicles. Over the last years its range of operating conditions was subsequently extended. In this framework the main emphasis was to generate test conditions which allow investigating the flow past hypersonic flight configuration from low altitude Mach 6 up to Mach 10 in approximately 33 km altitude. The studies performed in HEG focused on the external as well as internal aerodynamics including combustion of hydrogen in supersonic combustion and the investigation of transition from laminar to turbulent hypersonic flow.

Full Text:

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References

- Boehrke, H., Wartemann, V., Martinez Schramm, J., Wagner, A., Hannemann, K. and Eggers, T. (2012). Shock Tunnel Testing of the Transpiration-Cooled Heat Shield Experiment AKTIV. In *18th AIAA International Space Planes and Hypersonic Systems and Technologies Conference, AIAA/3AF*. <https://doi.org/10.2514/6.2012-5935>
- Friedl, D., Martinez Schramm, J., Hannemann, K. (2016). Measurement of Aerodynamic Coefficients of Blunt Cones at the High Enthalpy Shock Tunnel Göttingen. In *11th International Workshop on Shock Tube Technology*.
- Hannemann, K. (2003). High Enthalpy Flows in the HEG Shock Tunnel: Experiment and Numerical Rebuilding. In *41st AIAA Aerospace Sciences Meeting and Exhibit, AIAA 2003-0978*. <https://doi.org/10.2514/6.2003-978>
- Karl, S., Martinez Schramm, J. and Hannemann, K. (2004). Experimental and Numerical Investigation of High Enthalpy Flow Past a Cylinder in HEG. In *24th International Symposium on Shock Waves*. Berlin, Heidelberg: Springer. https://doi.org/10.1007/978-3-540-27009-6_24
- Karl, S., Hannemann, K., Mack, A., Steelant, J. (2008). CFD Analysis of the HyShot II Scramjet Experiments in the HEG Shock Tunnel. In *15th AIAA International Space Planes and Hypersonic Systems and Technologies Conference, AIAA 2008-2548*. <https://doi.org/10.2514/6.2008-2548>
- Karl, S., Steelant, J. (2018). Crossflow Phenomena in Streamline-Traced Hypersonic Intakes. *Journal of Propulsion and Power*, 34(2), 449-459. <https://doi.org/10.2514/1.B36637>
- Kirmse, T., Schröder, A., Martinez Schramm, J., Karl, S. and Hannemann, K. (2009). Application of Particle Image Velocimetry and the Background Oriented Schlieren Technique in the High Enthalpy Shock Tunnel Göttingen HEG. In *27th International Symposium on Shock Waves*. Berlin, Heidelberg: Springer. <https://doi.org/10.1007/s00193-011-0314-2>
- Laurence, S., Wagner, A. and Hannemann, K. (2014). Schlieren-based techniques for investigating instability development and transition in a hypersonic boundary layer. *Experiments in Fluids*, 55(8). <https://doi.org/10.1007/s00348-014-1782-9>
- Laurence, S., Butler, C.S., Martinez Schramm, J. and Hannemann, K. (2018). Force and Moment Measurements on a Free-Flying Capsule in a Shock Tunnel. *Journal of Spacecraft and*

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Rockets, 55(2), 403-414. <https://doi.org/10.2514/6.2018-5385>

Lu, F.K., Marren, D.E. (Eds.). (2002). *Advanced Hypersonic Test Facilities. Progress in Astronautics and Aeronautics, Volume 198*. Reston: AIAA.

Lukasiewicz, J. (1973). *Experimental Methods of Hypersonics*. New York: Marcel Dekker, Inc. <https://doi.org/10.1017/S0001924000041919>

Martinez Schramm, J., Karl, S., Hannemann, K. and Steelant, J. (2008). Ground testing of the HyShot II Scramjet Configuration in HEG. In *15th AIAA Int. Space Planes and Hypersonic Systems and Technology Conference, AIAA 2008-2547*. <https://doi.org/10.2514/6.2008-2547>

Martinez Schramm, J., Wagner, A., Wolfram, J., Hannemann, K., Barth, T., Mulot, J.-D. and Schröder, A. (2009). Post flight analysis of SHEFEX I: Shock tunnel testing and related CFD analysis. In *16th AIAA/DLR/DGLR International Space Planes and Hypersonic Systems and Technologies Conference*. <https://doi.org/10.2514/6.2009-7216>

Ozawa, H., Laurence, S., Martinez Schramm, J., Wagner, A. and Hannemann, K. (2015). Fast response temperature sensitive paint measurements on a hypersonic transition cone. *Experiments in Fluids*, 56(1), 1853. <https://doi.org/10.1007/s00348-014-1853-y>

Robinson, M., Hannemann, K. (2006). Short Duration Force Measurements in Impulse Facilities. In *25th AIAA Aerodynamic Measurement Technology and Ground Testing Conference, AIAA 2006-3439*. <https://doi.org/10.2514/6.2006-3439>

Sandham, N. D., Schülein, E., Wagner, A., Willems, S. and Steelant, J. (2014). Transitional shock-wave/boundary-layer interactions in hypersonic flow. *Journal of Fluid Mechanics*, 752, 349-382. <https://doi.org/10.1017/jfm.2014.333>

Stalker, R.J. (1967). A Study of the Free-Piston Shock Tunnel. *AIAA Journal*, 5(12), 2160-2165. <https://doi.org/10.2514/3.4402>

Tropea, C., Yarin, A.L., Foss, J.F. (Eds.). (2007). *Springer Handbook of Experimental Fluid Mechanics*, Berlin, Heidelberg: Springer.

Wagner, A., Kuhn, M., Martinez Schramm, J. and Hannemann, K. (2013). Experiments on passive hypersonic boundary layer control using ultrasonically absorptive carbon-carbon material with random microstructure. *Experiments in Fluids*, 54(10), 1606. <https://doi.org/10.1007/s00348-013-1606-3>

Wagner, A., Schramm Martinez, J., Hickey, J.P. and Hannemann, K. (2016). Hypersonic Shock Wave Boundary Layer Interaction Studies on a Flat Plate at Elevated Surface Temperature. In *22nd International Shock Interaction Symposium*. Retrieved from: <http://www.gla.ac.uk/conferences/shockinteractionsymposium/>

Wagner, A., Schülein, E., Petervari, R., Hannemann, K., Ali, Syed R. C., Cerminara, A. and Sandham, N. D. (2018). Combined free-stream disturbance measurements and receptivity studies in hypersonic wind tunnels by means of a slender wedge probe and direct numerical simulation. *Journal of Fluid Mechanics*, 842, 495-531. <https://doi.org/10.1017/jfm.2018.132>

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