

# Joseph Steer

## Aerospace Scientist

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### Joseph Steer

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### Skills

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Fortran, Python, C, C++, MATLAB, Git

Solidworks, Data Analysis, LaTeX, Multi-Physics Fluid Simulation

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### Education

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#### University of Oxford / DPhil in Engineering Science

OCTOBER 2020 - OCTOBER 2024

- Developed a quasi-1D shock and expansion tube model in Fortran / C++ called LASTA 2.0 (LAgrangian Shock Tube Analysis)
- Implementation of two-temperature thermochemical model, boundary layer model, Newton's method with exact Jacobian
- Fundamental radiation experiments for Ice Giant exploration, Lunar return using spectrally integrated photomultipliers, high speed video, coaxial thermocouples, calorimeters
- Engineering design of hydrogen gas handling system, Mach 10 hypersonic expansion nozzle, steel shock tube for shock layer radiation studies, sphere cone model
- Funded by the European Space Agency (ESA) OSIP program

#### University of Adelaide / Bachelor of Mechanical & Aerospace Engineering (Honours)

FEBRUARY 2015 - NOVEMBER 2019, ADELAIDE

- Grade point average 6.9/7 (Australian system)
- Dean's award for academic excellence
- Sir Ross & Sir Keith Smith scholarship for aerospace students

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### Professional Experience

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#### University of Oxford / Postdoctoral Researcher in Hypersonics

OCTOBER 2024 - OCTOBER 2026, OXFORD

- Funded through an Engineering and Physical Sciences Research Council (EPSRC) grant
- Fundamental measurements of thermochemically relaxing gases in an expanding flow environment for application to vehicle wake radiation modelling
- Experiments to take place in the T6 hypersonic wind tunnel in 2026
- Continuation of DPhil work to further develop the LASTA tool

## University of Oxford / Research Assistant in Hypersonic Test Facilities

JANUARY 2020 - PRESENT, OXFORD

- Operator of the Oxford High Density Tunnel and T6 Stalker Tunnel. Start up, shut down, firing
- Operation of schlieren optics, high -speed cameras, infrared thermography, spectroscopy, class 4 lasers, pressure sensitive paint, high-speed pressure transducers, heat flux gauges, etc.
- Engineering design of hydraulic systems, high pressure piping

## Santos Ltd / Engineer

NOVEMBER 2018 - FEBRUARY 2019, ADELAIDE

- Asset integrity team
- Review of passive fireproofing on large (500 m<sup>3</sup> +) LPG storage vessels
- Design to ISO / AS fireproofing standards, cost scoping, site visits

## AssetOn Technologies / Engineer

FEBRUARY 2017 - JANUARY 2018, ADELAIDE

- Worked with a small team to develop and market the Mining Toolbox software
- Benchmarking tool for heavy mining equipment that provides budget models, feasibility models, plant rates to clients
- MySQL Database software

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## Publications

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### Journal of Spacecraft and Rockets

Steer, J., Collen, P., Glenn, A., Hambidge, C., Doherty, L., McGilvray, M., Loehle, S. and Walpot, L. 2024. Commissioning of upgrades to T6 to study giant planet entry.

### AIAA SciTech 2024

J Steer, J Clarke, M McGilvray, DM Luca. 2024. LASTA 2.0: Validation of a Reverse Time Integration Method

T.J. Crumpton, J. Steer, J Clarke, A.B. Glenn, P.L. Collen and M. McGilvray. 2024. Analysis of Mars Entry Shock Wave Radiation in the T6 StalkerHypersonic Wind Tunnel

### AIAA SciTech 2023

Steer, J., Collen, P., Glenn, A., Hambidge, C., Doherty, L., McGilvray, M., Loehle, S. and Walpot, L., 2023. Shock radiation tests for Ice Giant entry probes including CH<sub>4</sub> in the T6 free-piston driven wind tunnel.

Steer, J., Collen, P., Glenn, A., Sopek, T., Hambidge, C., Doherty, L., McGilvray, M., Loehle, S. and Walpot, L., 2023. Experimental simulation of a Galileo sub-scale model at Ice Giant entry conditions in the T6 free-piston driven wind tunnel.

## **FAR Conference 2022**

McGilvray, M., Collen, P., Doherty, L., Steer, J., Leader, J., Glenn, A. and Hambidge, C., 2022. The Oxford T6 Stalker tunnel: performance, upgrades and new modes of operation.

## **ESA RHTG 2022**

Leader, J., Steer, J., Collen, P. and McGilvray, M., 2022. Measurement of aeroheating of satellite components at true flight total enthalpies.

Steer, J., Collen, P., Glenn, A., Hambidge, C., Doherty, L., McGilvray, M., Loehle, S. and Walpot, L., 2022. Shock radiation tests for Ice Giant entry probes including CH<sub>4</sub> in the T6 free-piston driven wind tunnel.

Steer, J., Collen, P., Glenn, A., Sopek, T., Hambidge, C., Doherty, L., McGilvray, M., Loehle, S. and Walpot, L., 2022. Experimental simulation of a Galileo sub-scale model at Ice Giant entry conditions in the T6 free-piston driven wind tunnel.

## **AIAA SciTech 2022**

Loehle, S., Meindl, A., Poloni, E., Steer, J., Sopek, T., McGilvray, M. and Walpot, L., 2022. Experimental Simulation of Gas Giant Entry in the PWK1 Arcjet Facility including CH<sub>4</sub>. In AIAA SCITECH 2022 Forum (p. 0264).

## **AFMC 2018**

Steer, J., Li, S.W., Morcom, N., Jucius, S., Ghanadi, F. and Arjomandi, M., 2018. Pedestrian-level wind conditions around buildings for wind comfort assessment.

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## **Teaching Experience**

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### **University of Oxford / Coursework Module Demonstrator**

MARCH 2021 - PRESENT, OXFORD

### **University of Oxford / B9 Tutor**

MARCH 2021 - PRESENT, OXFORD

### **Lincoln College / Open Day Tutor**

MAY 2023