

Postdoctoral Research Fellowship(s) in Solar Thermal Energy Research

Stellenbosch University's [Solar Thermal Energy Research Group](#) (STERG), hosted within the Department of Mechanical and Mechatronic Engineering, is seeking applicants for Postdoctoral Research Fellow positions.

STERG's primary mission is to train students and deliver research outputs in Concentrating Solar Power (CSP) and related technologies. Three key focus areas have been identified in STERG's research strategy, which centres on low-cost / low-carbon energy provision through Concentrating Solar Thermal (CST) energy. Applicants are encouraged to apply for a research fellowship in one of the following:

Area 1: Solar fuels (*specific focus: concentrating solar collectors*)

This area focuses on producing solar fuels and green hydrogen, utilising photocatalysis or solid oxide electrolysis cells (SOEC) using concentrating solar collectors. The Postdoctoral Research Fellow will assist with the construction and performance testing of novel heliostat and collector prototypes and develop a proof-of-concept facility for integrating CST energy into green hydrogen or e-fuels production. The ideal candidate will combine a solid mechanical engineering background with experience in concentrating optics and single- or dual-axis tracking systems for CST (such as heliostats, parabolic troughs or linear Fresnel concentrators).

Area 2: Modular CSP (*specific focus: steam piston generators*)

Modular CSP plants (5 – 10 MW) offer advantages in terms of better optics, lower capital cost and adaptable scale for various applications or phased expansion. This research area focuses on developing steam piston generators (instead of turbines) for converting thermal energy to mechanical work in modular CSP plants. A piston expander prototype has been developed and operated using compressed air at Stellenbosch University. The research fellow will assist with further developing the prototype, using steam as the working fluid. The ideal candidate will combine a strong background in mechanical design with a thorough working knowledge of thermodynamics. Experience with the design or testing of internal combustion engines will be a distinct advantage.

Area 3: Autonomous services (*specific focus: unmanned aerial vehicles*)

4IR technologies enable rapid and cost-effective operations in CST plants. Stellenbosch University has been investigating the use of Unmanned Aerial Vehicles (UAVs) for heliostat calibration and has developed and tested successful prototypes in a laboratory setting. This area focuses on extending this research to in-field testing and investigating alternative uses of UAVs in the CST space (e.g. for cleaning heliostats). The research fellow will expand the heliostat calibration system to include outdoor environments or develop a drone to clean heliostats. The ideal candidate will: have experience in programming with high-level languages such as Python or Matlab; be familiar with mathematical optimisation algorithms, control system theory and basic robotics.

Hosts:

- Prof. Craig McGregor (Area 1, craigm@sun.ac.za)
- Prof. Chris Meyer (Area 2, cjmeyer@sun.ac.za)
- Dr. Willie Smit (Area 3, wjsmit@sun.ac.za)

Location: [Department of Mechanical & Mechatronic Engineering](#), Stellenbosch University, Stellenbosch, South Africa.

Duties and responsibilities:

The research fellow(s) will be expected to:



- perform research and publish the results at local and international conferences and in high-impact journals;
- limited mentoring and supervision of under- and postgraduate students within STERG will also be required;
- play an active role in shaping STERGs future research agenda, including writing research and grant proposals and collaborating with industry experts to ensure continued alignment with industry needs.

General requirements:

- A PhD in a relevant field (preferably mechanical or mechatronic engineering):
 - must have graduated within the last five years,
 - candidates with a confirmed examination outcome who have not yet graduated may apply (proof required);
- Excellent communication skills in English (both written and verbal);
- A proven publication record in high-impact journals and a demonstrated capacity to conduct independent research (minimum one relevant published article in a Scimago Q1 or Q2 journal).

Remuneration: STERG currently has guaranteed funding for one fellowship of R 250 000 per annum (for 2023). Additional fellowships may be awarded at the same rate pending the outcome of funding applications currently under review. The fellowship(s) are renewable for up to three years, subject to satisfactory performance and availability of funding.

Please note that postdoctoral fellows are not appointed as Stellenbosch University employees. The remuneration is thus exempt from tax and the appointment does not include employee benefits.

Commencement of duties: February 2023 or as soon as possible after that.

Application closing date: 17h00 on 31 January 2023.

Application process: Send a letter of application, accompanied by a comprehensive curriculum vitae, including a list of publications, a link to the candidate's PhD thesis, and the names and contact details of two referees, to Prof Craig McGregor (craigm@sun.ac.za). The application letter should specify the research area of interest and provide a brief motivation of why the candidate feels well suited for an appointment in that area.