



THE UNIVERSITY *of* EDINBURGH

School of Engineering

IMP PhD seminar

1.00 - 2.00 pm on June 9th

Sanderson Classroom 3

Numerical Modelling and Analysis of Thermal Plasma Generated by DC Arc Plasma Torch

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ABSTRACT

The great property of high ionization and high energy density in thermal plasma makes it popular in various applications, such as welding, plasma cutting, spraying and waste destruction, etc. However, with the limitation of measurement methods, some of the vital information about thermal plasma during processing are difficult to obtain thoroughly and precisely. In this presentation, the author will first introduce the basic knowledge of thermal plasma modelling, including the local thermodynamic equilibrium (LTE) assumption, popular thermal plasma generators and their governing equations. And taking the direct-current (DC) arc plasma torch as an example to illustrate how to develop numerical modelling of thermal plasma step by step. Meanwhile, the work of the author on the thermal damage prediction of the DC arc plasma torch will be shared and discussed.

SPEAKER

Mr. Xinyang Wei is a PhD student at the nanoManufacturing Science Lab in Osaka University under the supervision of Prof Kazuya Yamamura. His research interests are focused on plasma surface processing, numerical modelling, digital twin, and processing diagnosis. Mr. Wei has worked at the Huzhou Institute of Zhejiang University as a research assistant and engaged in the co-project with PlasmaTrack Ltd. for the digital modelling of a direct-current (DC) arc plasma torch. He has published two papers [1,2] with regard to DC arc plasma modelling.

Ref:

[1] Wei, X., Xu F., Bennett, A., Swan, J., Pulsford, J., Chen, G., Yu, N. Numerical analysis of direct-current (DC) plasma processing for high efficient steel surface modification. Intl. Journal of Adv Manuf Tech, 2023, 124, 2215–2228.

[2] Wei, X., Pulsford, J., Bennett, A., Wang, B., Xu F., Yu, N. Thermal Analysis and Digital Design for Non-transferred Plasma Processing, 8th International Conference on Nanomanufacturing & 4th AET Symposium on ACSM and Digital Manufacturing (Nanoman-AETS), Dublin, Ireland, 2022, pp 1-6.