A total of 15 PhD positions are available at 7 universities, 3 research centres and 2 companies, in the framework of the Horizon 2020 Marie Skłodowska-Curie European Training Network (ETN) TEAMAero. The main objective of TEAMAero is to develop new scientific knowledge, capabilities, and technologies for aeronautics industry. The researchers recruited in TEAMAero will investigate emerging technologies through laboratory experiments, theoretical modelling and numerical simulations addressing aspects of shock wave boundary layer interaction and flow control methods. It is essential for the development of future, more efficient aircrafts and engines. The aviation industry is entering an era of new technology and requires high-performance wings, control surfaces, intakes and turbomachinery blades, where transonic flow is common and the formation of shock waves is the key aerodynamic challenge.

In that context, the University of Glasgow is offering an ESR position for a PhD project entitled

**Stability study of unsteady separated flows**

**Objectives:** To develop and validate CFD methods for flows near the onset of separation. To develop flow control schemes using vortex/rods/jets/porous surfaces, to delay the separation onset. To apply the CFD methods to forward-swept wing suitable for a civil aircraft. To further our knowledge in turbulence simulation methods by comparing established DES techniques with implicit LES methods (iLES) and observable turbulence concepts

**Expected Results:** Installation effects of flow control methods for alleviating the adverse effects of SBLI. The use of adjoint methods (new possibilities for coupling CFD with gradient-based optimisers) is proposed to give the sensitivity of flow to the location, number and shape of flow control devices and give better L/D for a wing across a range of flight conditions. ESR will build on the AIAA drag prediction workshop cases and will add simulated (via the embedded mesh method) flow control for SBLI. VGs and AJVGs will be considered at a first instance. The adjoint will attempt to re-distribute the flow control devices for optimal L/D over the flight envelope. A second step will consider the optimisation of each device in terms of size, angle to the flow, and properties. The final setup should maintain the optimal L/D. The flow solver to be used will be the HMB method of UGLA since it allows for the use of efficient frequency domain / harmonic balance methods for the analysis of unsteady flows. The combination of adjoint with harmonic balance is novel and has so far been demonstrated by UGLA for the analysis of helicopter blade flows, but it has never been applied to flow control and external wing flows. DES or iDDES will be exercised during the latter months of the project. Any experience gained from the aforementioned studies will be directly transferable to internal flows too, with UGLA already working on adjoint for flow control applied to shock-trains inside high-speed engine intakes.

The PhD will be based at the University of Glasgow and supervised by Prof. George Barakos. Secondments are foreseen at partner institutions of the TEAMAero network.

**Additional Requirements:**

The candidate must fulfil requirements of English language proficiency: IELTS scores of 6.5 or above.
Early Stage Researcher position

Towards Effective Flow Control and Mitigation of Shock Effects in Aeronautical Applications

The multidisciplinary topics addressed in TEAMAero are scientifically challenging and of high technological and economical relevance, promising interesting career perspectives in academic and multi-sectorial industrial environments. The TEAMAero partners do strictly adhere to the ethical standards of the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers\(^1\). Female scientists are particularly encouraged to apply. Applicants must satisfy some eligibility rules, in particular in terms of transnational mobility.\(^2\) A strict equal opportunity, gender-neutral and internationally comparable recruitment procedure is implemented. Applications are to be made through the EURAXESS web site: https://euraxess.ec.europa.eu/jobs/523367

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2. [http://ec.europa.eu/research/mariecurieactions](http://ec.europa.eu/research/mariecurieactions)

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