

**Organization/Company:** Siemens Industry Software N.V.

**Academic supervisor:** TU München, Prof. Dr. Wolfgang Polifke

**Location:** Belgium, Leuven

**Research field:** Fluid Dynamics, Combustion, Acoustics

**Research profile:** First Stage Researcher (R1)

**Type of contract:** temporary

**Job status:** full-time

**Hours per week:** 39

**Offer starting date:** 1<sup>st</sup> March 2019

**Application deadline:** 30<sup>th</sup> September 2019

**EU RESEARCH FRAMEWORK PROGRAMME:** H2020 / Marie Skłodowska-Curie Actions

**MARIE CURIE GRANT AGREEMENT NUMBER:** 813367

**Job title:** Dynamics of hydrogen flames and flashback phenomena using CFD simulation

## Background

Combustion of hydrogen from renewable energies is an emerging technology that can replace fossil fuels and so provide carbon-neutral energy. The objective of the Innovative Training Network POLKA is to solve serious technical problems, which are specific to hydrogen combustion: thermoacoustic instabilities and flashback. Thermoacoustic instabilities are large-amplitude pressure oscillations produced by interactions between the flame and acoustic waves. They tend to occur unexpectedly and can cause catastrophic damage to hardware combustor. Flashback is the dangerous phenomenon of the flame propagating backwards into components not designed for high temperatures.

## POLKA - POLution Know-how and Abatement

The ultimate vision of the POLKA research and training initiative is to create new physical insight and advanced simulation tools, so as to underpin the development of hydrogen-fueled combustion systems (gas turbines, aero-engines, boilers, furnaces, ...). The methods to be used within this international network are a combination of experiments, numerical simulations and analytical techniques. Several positions are available for early-stage researchers (doctoral candidates) in the POLKA network, funded by the European Commission under Horizon 2020 / Marie Skłodowska Curie. POLKA is a multi-disciplinary project providing research training in computational fluid dynamics, combustion, acoustics, control and data science. The project will shape early career talents in a network of world leading scientists and industrial partners to work on one of the most severe design issues in aviation technology.

Academic project partners are Univ. of Keele, TU München, TU Eindhoven, Univ. degli Studia di Genova, Univ. Di Pisa, KTH Stockholm and KU Leuven. Partners from industry are Ansaldo, Bekaert, IFTA, SIEMENS and others. A position for a doctoral student ("early stage researcher") in the RTD acoustics team in Siemens Industry Software in Leuven will open in the first quarter of 2019. It is

If you wish to apply, or to discuss any details of the project informally, please contact:  
Michiel Ceunen, Siemens Industry Software NV., [michiel.ceunen@siemens.com](mailto:michiel.ceunen@siemens.com),

planned to study flashback and thermoacoustic instabilities of fuels with significant hydrogen content through high-fidelity, scale-resolving Computational Fluid Dynamics (CFD) simulations and coupling of CFD with reduced fidelity models. Simcenter STAR-CCM+ will be used as primary simulation tool, complemented by other in-house or open source tools when identified as necessary. Special attention will be given to acoustic boundary conditions, identification of flame transfer functions, prediction of flashback and signal processing for early-stage detection of instabilities.

### **Major responsibilities**

Your major responsibility as an early stage researcher is to carry out high-quality scientific research. This includes developing scientific concepts and communicating research results both verbally and in writing. As a research fellow you will be registered as a PhD candidate with the Graduate School of TU München, under the supervision of Prof. Dr. Wolfgang Polifke (<http://www.professoren.tum.de/en/polifke-wolfgang/>).

### **Duration**

The studentship will be for three years. There is some flexibility on the start date of each studentship, ranging from March to December 2019.

### **Remuneration**

The researchers will receive a full salary in line with the rules for European Industrial Doctorates (see <http://cordis.europa.eu/fp7/people/>) including contributions to pension scheme and health care. A mobility allowance is also provided to support travelling.

### **Qualifications**

A suitable background is a Master of Science degree in mechanical engineering, engineering physics, scientific computing or related fields. Experience in fluid dynamics, in particular combustion or acoustics is a requirement, and good programming skills are considered especially meriting. The position requires excellent oral and written communication skills in English.

### **Eligibility criteria**

Applicants must satisfy the eligibility rules stipulated by the Horizon 2020 Guidelines of the European Commission. In particular, they must not have performed their main activity in Belgium for more than 12 months of the 36 months preceding the position. Early-Stage Researchers must be in the first four years (full-time equivalent) of their research careers, starting at the date of obtaining the degree which would formally entitle them to embark on a doctorate.

Your application, with CV, names and contact information of at least two persons for reference, a list of publications (if applicable), and a summary of the M.Sc. thesis should be sent to [michiel.ceunen@siemens.com](mailto:michiel.ceunen@siemens.com) with subject "Application POLKA". The application should also include a complete academic record (credits and grades), including information on the grade point average,

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the maximum possible grade in the grading system that is in use at your university as well as the minimum passing grade. If possible, provide also a ranking within your class. Please make sure to combine all the documents in a single PDF file.

### **Selection process**

The recruitment procedures will be transparent, efficient and internationally comparable; they will be based on competitive selection with equal opportunities for all applicants. Candidates from disadvantaged groups will be encouraged to apply, while discrimination based on gender, ethnic origin, disability, ... will not be tolerated. European and national legal obligations will be adhered to, in particular the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers.

### **The Organization**

Siemens Industry Software N.V. (SISW, formerly known as LMS) is an engineering innovation company, with proven track record in the area of experimental, numerical and hybrid (mixed experimental-numerical) system modelling for noise, vibration, durability and fluid dynamics, performing substantial in-house research on advanced methods and applications. The RTD Acoustics team is a research unit welcoming several international doctoral candidates

Technische Universität München (TUM) is one of the leading technical universities in Germany and one of the first "Universities of Excellence" - with outstanding performance in research, education and talent promotion. TUM educates almost 40,000 students in more than 150 study programs, organized across 13 departments.

The Thermo-Fluid Dynamics Group is a research unit in the Department of Mechanical Engineering headed by Prof. Wolfgang Polifke, with three post-docs and a dozen research associates / doctoral candidates.

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