

Vacancies for a PhD-students in the field of

## Modelling of three-phase flows with catalytic particles

Eindhoven University of Technology  
Department of Chemical Engineering and Chemistry  
Multiphase Reactors Group  
PO Box 513, 5600 MB Eindhoven, The Netherlands

### Project description

We are looking for 6 PhD candidates for projects concerning the modeling of transport-phenomena in slurry-bubble columns. This chemical reactor type is encountered in a variety of large scale manufacturing processes such as the production of fuels, chemical building blocks, and many other products. In this research we focus on three-phase gas-solid-liquid multi-component systems with catalytic particles, which are frequently encountered in industrial applications, but have not been tackled fundamentally before due to their complexity.

All PhD projects are part of an overarching project entitled 'Modelling of three-phase flows with catalytic particles', which was recently awarded a prestigious ERC Advanced grant. An overview of the projects is depicted in the figure below. Three levels of complexity will be considered and a multiscale approach is adopted. Direct Numerical Simulation (DNS) is used for studying transport phenomena with high accuracy in systems with a relatively small number of bubbles and particles. So-called deterministic and stochastic Euler-Lagrange simulation methods will be used to simulate full columns on laboratory and industrial scale. The modeling will be experimentally validated.

method complexity	DNS	DEL/SEL	Experimental validation
<b>Momentum transfer</b>	PhD1: particle-liquid & bubble liquid drag	PhD4: hydrodynamics in a slurry bubble column	
<b>Mass transfer &amp; Bubble induced mixing</b>	PhD2: bubble-liquid mass transfer & mixing	PhD5: mass transfer in a slurry bubble column	
<b>Coupled mass &amp; heat transfer &amp; Catalytic reaction</b>	PhD3: mass, heat transfer & reaction	PhD6: mass, heat transfer & reaction in a slurry bubble column	

### Candidate profile

We are looking for candidates with a background in chemical, mechanical, thermal engineering, physics or a related field. The prospective researcher is expected to have experience in modeling of transport phenomena. An affinity with the process industry is preferred. The research will be computational, therefore experience with coding and modern software

development is valued. The ideal candidate has good scientific skills as well as excellent soft skills related to verbal and written communication. The candidate should be a team player.

### **Conditions of employment**

- A meaningful job in a highly motivated team at a dynamic and ambitious University. TU/e is one of Europe's top technological universities, situated at the heart of a most innovative high-tech region, with a wealth of collaborations with industry and academic institutes.  
A place to be for talented scientists!
- A full-time employment for four years, with an intermediate evaluation (go/no-go) after nine months.
- To support you during your PhD and to prepare you for the rest of your career, you will make a Training and Supervision plan and you will have free access to a personal development program for PhD students (**PROOF program**).
- A gross monthly salary and benefits (such as a pension scheme, pregnancy and maternity leave, partially paid parental leave) in accordance with the Collective Labor Agreement for Dutch Universities, with a gross salary of €2.541,- in the first year until €3.247,- gross in the fourth year of the PhD;
- Additionally, an annual holiday allowance of 8% of the yearly salary, plus a year-end allowance of 8.3% of the annual salary.
- Should you come from abroad and comply with certain conditions, you can make use of the so-called '30% facility', which permits you not to pay tax on 30% of your salary.
- A broad package of fringe benefits, including an excellent technical infrastructure, moving expenses, and savings schemes.
- **Family-friendly initiatives** are in place, such as an international spouse program, and excellent on-campus children day care and sports facilities.

### **Information and application**

Do you recognize yourself in this profile and would you like to know more? Please contact prof.dr.ir. J.A.M. Kuipers, E-mail: [j.a.m.kuipers@tue.nl](mailto:j.a.m.kuipers@tue.nl) ; Tel. +31 40 247 4158.

For information about terms of employment, please contact Sandra van de Weijer, HR Advisor, [p.j.v.d.weijer@tue.nl](mailto:p.j.v.d.weijer@tue.nl) or +31 40 247 4960.

Please visit [www.tue.nl/jobs](http://www.tue.nl/jobs) to find out more about working at TU/e!

## **Application**

We invite you to submit a complete application by using the 'apply now'-button on this page. The application should include a:

- Cover letter in which you describe your motivation and qualifications for the position.
- Curriculum vitae with details on education, employment, publications, research experience, and the contact information of at least two references.
- A list of BSc and MSc courses and grades.

We do not respond to applications that are sent to us in a different way. Please keep in mind you can upload only 5 documents up to 2 MB each. If necessary, please combine files.

We look forward to your application and will screen it as soon as we have received it. Screening will continue until all positions are filled.