CARPE Symposium
Porto, 2025

Special Interest Group: Computational-Aided Engineering

Computational-Aided Engineering (CAE) plays a significant role in modern engineering by offering advanced tools for analyzing, designing, and optimizing of complex real-word engineering systems. CAE spans critical disciplines such as computational fluid dynamics (CFD), computational solid mechanics, finite element analysis (FEA), and other multiphysics simulations. These methods/tools empower engineers and scientists to model complex physical phenomena, simulate real-world conditions, and improve the performance, and sustainability of products and systems across various engineering domains.

To establish a robust international collaboration in the diverse fields encompassed by CAE, we propose a new Special Interest Group (SIG) titled “CAE Methods and Applications”. This SIG will focus on the following objectives:

Research

- Promote cutting-edge research activities in CAE with applications in human health, climate change adaptation or mitigation, renewable energy, energy storages, and other societal challenges.
- Facilitate collaborative research among CARPE members and other external partners to address complex scientific, engineering and societal problems through integrated expertise.
- Explore the integration of artificial intelligence and machine learning into computational design, predictive modelling, and automated simulation workflows.
- Contribute to global research initiatives by developing joint funding proposals for EU Horizon programs and other international funding opportunities.

CARPE Consortium on Applied Research and Professional Education

P.PORTO

CARPE Symposium Porto, 2025

- Organize knowledge-sharing events, such as workshops, webinars, and conferences, to highlight the latest advancements and the best practices in CAE.

Education

- Integrate the state-of-the art CAE tools and methodologies, including CFD and FEA, into academic programs to provide students with practical skills in digital engineering, simulation, and modeling.
- Facilitate international faculty exchange programs to enhance education quality and strengthen cross-institutional collaboration.
- Develop targeted training programs, summer schools, and interdisciplinary courses that bridge the gap between theoretical knowledge and real-world application.

This SIG will act as a strategic platform to drive innovation, promote interdisciplinary collaboration and share state-of-the-art computational methods. It aims to address engineering challenges using advanced CAE techniques while generating high-impact outcomes such as collaborative research projects, scholarly publications, and practical applications that benefit both academia and industry.

Lead: Dr. Eero Immonen, Turku University of Applied Sciences (Turku UAS)

Co-lead: to be decided

Turku University of Applied Sciences (Turku UAS)

Turku UAS is one of Finland's leading universities of applied sciences, recognized for its strong focus on innovation, applied research, and close collaboration with industry. Within Turku UAS, the Computational Engineering and Analysis (COMEA) research group stands out for its expertise in simulation-driven engineering. COMEA specializes in applied CFD, FEA, solid mechanics, and optimal design and control. The group uses advanced computational tools and high-performance computing to address complex and real-world challenges across a variety of fields, including

CARPE Consortium on Applied Research and Professional Education

P.PORTO

CARPE Symposium Porto, 2025

energy systems, structural engineering, pharmaceuticals, additive manufacturing (3D printing), and urban infrastructure.

HAW Hamburg

At HAW Hamburg, research in Information and Technology stands at the forefront of innovation in Germany. With our focus on applied sciences, we drive and participate in state-of-the-art projects in engineering, computer science, and digital transformation. Our particular strength lies in the development and application of numerical methods in engineering – also in interdisciplinary collaboration and industry partnerships. For the CARPE-SIG we would like to recommend our Competence Center for Renewable Energy and Energy Efficiency as primary point of contact. We propose to contribute to research areas as e.g. Aeroelasticity of Wind-Turbines and Energy-Grid modelling. With a strong background in mathematics, physics and information technology, we believe ourselves to be a valuable partner for the modelling and simulation of complex physical processes to tackle real-world challenges with precision, efficiency, and impact.

University of Debrecen

University of Applied Sciences Utrecht

CARPE Consortium on Applied Research and Professional Education P.PORTO