Mohammad Shahid

Computational Modelling Engineer | Physics-Based Simulation | Multiphysics & Thermo-Mechanical R&D

Den Haag, Netherlands | Open to relocation within the Netherlands

mechshahid@gmail.com | +31 651585410 | Portfolio Website | GitHub | LinkedIn

Profile

Physics-driven computational modelling engineer with experience developing first-principles, compact reduced-order, and high-fidelity simulation workflows for complex physical systems. Strong background in multiphysics modelling, validation, sensitivity analysis, and translating simulation results into practical engineering guidance for R&D teams. Experienced in identifying dominant mechanisms, defining model applicability limits, and supporting design decisions through coupled thermal, flow, electromagnetic, and thermo-mechanical modelling. Interested in applying computational modelling and virtual prototyping to healthcare technology and medical-device R&D.

Core Competencies

- Physics-based modelling of coupled thermal, flow, electromagnetic, and thermo-mechanical systems
- First-principles analysis, mechanism identification, sensitivity studies, and performance-limit assessment
- Multiphysics workflows for concept evaluation, virtual prototyping, design support, and validation
- Model credibility assessment through benchmark comparison, high-fidelity cross-checking, mesh/time-step sensitivity, and numerical robustness checks
- Scientific programming and engineering analysis using MATLAB, Python, C++, and Fortran

Selected Modelling and Simulation Projects

Coupled Multiphysics Workflow Development

- Developed sequential simulation workflows linking electromagnetic loss, temperature rise, thermo-mechanical deformation, and response change in thermally loaded hardware systems.
- Investigated how coupled physical effects propagate across domains and translated results into engineering guidance on design sensitivity, model limits, and performance risk.

Compact Thermal Screening for Integrated Hardware Systems

- Developed first-principles thermal screening models using conduction, radiation, and natural convection to estimate heat-rejection limits in integrated high-power hardware.
- Compared simplified predictions with detailed 3D simulations to define model applicability limits and support early-stage design decisions.

Flow-Thermal and Plasma Solver Verification & Validation

- Verified and validated an in-house plasma-flow solver through benchmark cases, geometry and boundary-condition checks, mesh refinement, convergence studies, and comparison against analytical, numerical, and experimental references.
- Validated canonical cases including Poiseuille flow, de Laval nozzle flow, laminar round jet, and free-burning argon arc to assess solver robustness and modelling limits.

Computational Mechanics and Reduced-Order Modelling Portfolio

- Completed MSc-level computational mechanics projects covering XFEM fracture mechanics, FSI benchmark problems, POD/PGD model reduction, plane-stress elasticity, and numerical solver verification.
- Analysed crack-tip enrichment, stress-intensity factors, added-mass effects, elastic-wall FSI response, reduced-basis accuracy, and mesh/time-step/mode sensitivity. Portfolio: github.com/MechShahid

Work Experience

Guest Researcher – Computational Modelling **TU Eindhoven, Netherlands**

2025–Present

- Refined compact thermal models for 5G/6G active antenna units to improve front- and rear-side heat-dissipation estimates under realistic convection and radiation constraints.
- Checked simplified predictions against 3D CST simulations across geometry and emissivity variations to define model validity limits and improve early-stage design screening.

Researcher – Computational Modelling **TU Eindhoven, Netherlands**

2020–2025

- Developed compact analytical and numerical models for thermal management and electro-thermal behaviour in RF hardware, enabling faster early-stage assessment than full 3D simulation alone.
- Evaluated passive and assisted cooling concepts to clarify physical limitations, design trade-offs, and thermal operating windows in integrated hardware systems.
- Quantified sensitivity to convection, emissivity, radiation exchange, geometry, and interface assumptions, converting model comparisons into operating limits and practical engineering guidance.

Early Stage Researcher – Multiphysics Modelling, EU MyWave **TU Eindhoven, Netherlands**
2020–2023

- Developed first-principles electro-thermal models to study passive intermodulation, localized self-heating, and temperature-driven response changes in high-frequency structures.
- Built coupled simulation workflows to analyse how electromagnetic losses propagate into temperature rise, deformation, and system-level performance variation.
- Used simplified and high-fidelity numerical models together to identify dominant physical mechanisms and define modelling assumptions for faster assessment workflows.

R&D Intern – Multiphysics Modelling **Ericsson, Sweden**
2021–2022

- Developed a compact MATLAB thermal-resistance model for rapid concept screening of active antenna unit cooling, using company-provided geometry, heat-load definitions, material assumptions, and design constraints.
- Benchmarked the MATLAB model against CST simulations to clarify where simplified modelling was sufficient for early design decisions and where detailed simulation was required.
- Collaborated with industrial R&D engineers to translate modelling inputs, assumptions, and sensitivity results into practical guidance for cooling-concept evaluation.

M.Sc. Intern – Flow-Thermal and Plasma Solver Validation **Akryvia, France**
2019

- Verified and validated the in-house YAPS plasma-flow solver by testing geometry treatment, boundary conditions, numerical settings, and benchmark cases.
- Performed convergence and robustness studies involving mesh refinement, under-relaxation, and progression-factor sensitivity.
- Validated canonical flow cases including Poiseuille flow, de Laval nozzle flow, laminar round jet, and free-burning argon arc against analytical, numerical, and experimental references.

M.Tech Thesis – Unsteady Heat-Transfer and Flow Simulation

- Developed and adapted an in-house finite-difference Fortran solver for unsteady thermo-fluid simulations around a torsionally oscillating heated cylinder with prescribed boundary motion.
- Performed grid-independence checks, time-step sensitivity studies, and benchmark validation before analysing wake behaviour, force response, and Nusselt-number trends.

Education

Doctoral Research in Computational Modelling, Defence Pending **TU Eindhoven, Netherlands**
2020–Present
Research focus: physics-based multiphysics modelling, electro-thermal analysis, thermo-mechanical coupling, and simulation-driven design of high-frequency hardware.

M.Sc. Mechanical Engineering, Computational Mechanics **E.C.N., Nantes, France**
2019

M.Tech Mechanical Engineering, Thermal Sciences **Z.H.C.E.T., AMU, India**
2018

B.Tech Mechanical Engineering **Z.H.C.E.T., AMU, India**
2011

Technical & Language Skills

Simulation: CST Studio Suite, COMSOL, ANSYS Fluent/Workbench, OpenFOAM, STAR-CCM+
Programming: MATLAB, Python, C++, CUDA C/C++, Fortran
Methods: physics-based modelling, FDM, FVM, FEM fundamentals, ADI schemes, iterative solvers, sensitivity analysis, verification and validation
Domains: heat transfer, thermo-fluid modelling, electro-thermal coupling, thermo-mechanical deformation, multiphysics simulation
Post-processing & documentation: NumPy, pandas, Matplotlib, ParaView, Excel, LaTeX, GitHub, reproducible simulation workflows
Languages: English professional, Dutch A2+, French A1, Hindi/Urdu native