



Matthieu SERRE

Doctor in mechanical simulation |
Scientific software development

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📍 Paris, France

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Summary

Research and development engineer, specialized in numerical simulation of mechanical systems. Experienced in multibody dynamics, contact mechanics and software development. Proficient in Fortran and object oriented Python. Strong ability to work in interdisciplinary teams.

🛠️ Programming Skills

- Programming languages: Fortran Python C++ CMake Shell (bash,zsh) MATLAB Mathematica
- Programming environments: Linux CI/CD tools VSCode GitLab GitHub
Large scale computations on cluster (slurm)

🔬 Scientific Skills

- Numerical simulation Non linear dynamics Lagrangian mechanics Contact Mechanics Finite Element Method
- Linear vibrations, modal decomposition Flexible Multibody Dynamics (robotics) Differential Geometry
- Numerical Schemes Electromagnetics

📁 Work Experience

Dotblocks Solutions : Research Engineer - Multiphysics solvers development in Python, (Paris, France)

Jan 2025 – Apr 2025

- Implemented the Finite Element method for thermal and mechanical applications.
- Implemented a thermo-mechanical weak coupling between Boundary Element Method & Finite Element solvers.
- Refactored time-marching algorithms into a standalone module shared across all solver repositories.

Python GitLab CI/CD Tools Numerical Schemes Finite Element Method

CEA - EDF : PhD - Contact model reduction applied to flexible multibody dynamics, Dynamics Studies Lab. (Saclay, France)

Jul 2020 – Dec 2024

Developed a numerical model for the vibratory behavior of flexible multibody systems undergoing shocks enables accurate structural health monitoring in hard-to-access environments. Integrated my developments in industrial codes in Fortran and C++.

- Numerical modeling of vibratory behaviour of flexible multibody systems under shocks.
- Developed an explicit integration scheme for flexible multibody dynamics (Lie-group integration and inertia coupling). Integrated into an industrial Fortran code.
- Designed a circle-cone reduced contact model for accurate non-linear contact solicitations with low computational cost. (Fortran, slurm, data processing with pandas)
- Industrial case study on a pressurised-water reactor component; validated the numerical model against experimental results. (Fortran, Python)

Communication

- CSMA 2022 (Giens, France): “Vibratory modelling of multibody systems”.
- Nodycon 2023 (Rome, Italy): “A reduced model for conical contact dedicated to flexible multibody dynamics”.
- Final thesis [manuscript](#).

Python C++ Fortran Flexible Multibody Dynamics (robotics) Lagrangian Mechanics
Numerical Schemes Contact Mechanics Finite Element Method Differential Geometry

Akka Tech. : R&D engineer (VIE) - Mercedes Benz (Stuttgart, Germany)

Oct 2017 - Oct 2019

- **Acoustic test engineer**

Conducted acoustic test campaigns in a team of four on entire vehicles within strict deadlines.

- Conceived a measurement system for sound intensity in a car cabin.
- Planned and ran test campaigns; analysed frequency response and produced technical reports.

Signal treatment Sensors Data acquisition

- **Electromagnetic simulation engineer**

Development of an electromagnetic-based acoustic optimization process for electric motors (NVH). Internal expertise development for future customers' acquisition.

- Finite element electromagnetic calculations of magnetic forces.
- Acoustic computations with magnetic forces as input.
- Process presentation to customers.

Electromagnetic simulation Acoustic simulation

🔧 Projects

Personal projects

2025

- [Implementation](#) of the 2D [Finite Difference Method](#) from scratch in [Python](#), applied to thermal study cases.
- [Implementation](#) of Euler explicit, Adams-Bashforth and Crank-Nicholson [Numerical Schemes](#) from scratch in [Python](#), applied to thermal analysis and other study cases.

Student projects

2016

- **Partnership with Decathlon**
 - Production of an embedded monitoring [Arduino](#)-based box (vibration, speed, use duration) for long-term customer tests on scooter prototypes.
 - Main constraints: size, autonomy.
 - Technical solutions: [Arduino](#) board, sensors, relays.
- **Structural Health Monitoring on a Safran turbo-reactor nacelle**
 - Based on a network of piezoelectric sensors.
 - [MATLAB](#) implementation of a damage detection algorithm on the composite structure.

🎓 Education

PhD - Dynamics Study Lab. CEA (Saclay, France)

Applied mathematics to numerical simulation, non linear dynamics, finite element modeling, reduced contact model, calculation-experiment correlation.

Jul 2020 - Dec 2024

Engineering degree - Arts et Métiers (ENSAM)

Sep 2013 - Sep 2016

- Specialty : applied mathematics to numerical simulation, finite element method, linear dynamics.
- Multi-disciplinary generalist training:
 - Mechanical engineering, industrial engineering,
 - Fluid dynamics, thermodynamics, electronics,
 - Controlled systems.

Preparatory classes for top schools - Lycée Hoche (Versailles France)

Sep 2010 - Sep 2013

- Specialty : Physics and Chemistry.

🌐 Languages

German-C2 | English-C2 TOEIC 935/990 | French-Native