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Fluid dynamics Engineer

Scope of Intervention

Field of competences in fluid dynamics, aerodynamics, hydrodynamics and energetics,

Numerical simulation, CFD code development

Management and design of tests and experimental validations in fluid dynamics,

Management of R&D projects and team, design office…

Education

2004   **Advances in aeroacoustics**

Von Karman Institute for fluid dynamics Lecture Series, Belgium.

1999-2003   **Ph.D., fluid mechanics**

University of Orleans, France.

1998-1999   **M.Sc., aerodynamics**

University of Orleans, France.

Aerodynamics, fluid dynamics, compressible flow, multiphasic flow, thermodynamics…
Computational fluid dynamics, experimental methods in fluid: LDA, PIV…

1996-1999   **M.Eng., energetics & fluid dynamics**

ESEM (Engineer superior school for materials and energetics), Orleans, France.

Fluid dynamics, Energetics, thermics, combustion, thermodynamics, Computer Science, Materials, CAD…

Professional Experiences

Since 2006   **Aerodynamic Systems Manager**

NSC Group (T.O. 160 M€), World leader for Non-woven textile machinery

Head of all air related subjects of a textile machinery manufacturer group

❑ R&D projects manager
- Aerodynamic optimisation of air transferred non-woven web devices : new design, validations and -30% cost achievement.
- New fans design and validation
- Aerodynamic barrier of high speed non-woven web production investigation : +40% production achieved, new devices to be proposed to customers
- Mechanical and textile efficiency : prototypes designed and validated, now in production in UK, USA, Turkey, Spain…
- Survey of textile machinery parameters of production with aerodynamic tools : patented

❑ Design office
- Air handling systems design and calculation
- Cost killing of existing devices
- Management in design office : technicians and projects

❑ After sale
- Failure investigation
- Setup and fine tuning of air systems during warranty period

2005　　**Mechanical engineer**
　　　　　CILAS (T.O. 25M€), EADS group.

- 2 months -　MegaJoule Laser project.

- ❑ In charge of optical amplifier definition proofreading procedure (reports, contractual documentation) for CEA review of definition.
  - Evaluation of particularities required by customer (CEA),
  - Managing the conformity of the definition towards schedule of conditions,
  - Preparation of tests for conformity validation.

2003-2004　**Computational fluid dynamics and test engineer**
　　　　　　　LME (Laboratory for Mechanics and Energetics), Orleans, France

- 18 months -　In charge of numerical studies and experimental validations in aerodynamics within industrial matters.

- ❑ Low Reynolds number lifting surfaces, boundary layer investigation
  - **Team** : with 1 undergraduate student,
  - **Objectives** : Experimentally settle results from high Reynolds number flows to low Reynolds number flows in terms of vortices and over lift phenomena,
  - **Achievement** : 3D unsteady Fluent simulation,
    Experimental design for wind tunnel testing,
    Experimental planning and results analysis,
  - **Tools** :　Fluent, Wind tunnel, pressure probes, hotwires, 1D aerodynamic balance.

- ❑ Aeromechanical behaviour of a lightweight UAV (Bertin Technology)
  - **Team** : with 1 assistant eng., 2 technicians (electronics & mechanics),
  - **Objectives** : Experimental investigation of flight domain over 1200 flight configurations (sweep, incidence, oncoming flow velocity, rpm...),
  - **Achievement** : Totally new wind tunnel mounting system,
    Configuration of 6D aerodynamic balance,
    Configuration of analogue data acquisition device ,
    Experimental planning and results analysis,
  - **Tools** :　Fluent, Wind tunnel, pressure and velocity probes, 6D aerodynamic balance.

- ❑ Optimisation of endurance race cars aerofoil (PSA customer team)
  - **Team** : with 1 PhD graduated eng., 1 assistant eng., 4 undergraduate students,
  - **Objectives** : In order to reduce top speeds, FIA rules stand for smaller span aerofoil. The purpose of the study was to reach aerodynamic performance when airfoil span is reduced,
  - **Achievement** : 2D airfoil numerical investigation,
    3D numerical investigation (distributed Fluent calculus with 2 – 3 millions cells),
    Experimental validations,
    Solutions reduced to two major aerofoil configurations,
  - **Tools** :　Xfoil, Fluent, Wind tunnel, pressure and velocity probes, 6D aerodynamic balance.

- ❑ Air conditioning circuits design for regional transport aircraft (Daher)
  - **Team** : with 1 PhD student,
  - **Objectives** : Air conditioning in transport aircraft uses highly winding circuits. Head losses in particular junction have been numerically investigated and compared with experimental results,
  - **Achievement** : 3D Fluent investigation,
    Good Accordance with experimental measurement of head losses,
  - **Tools** :　Fluent.

2002-2004   Fluid dynamics and computer science lecturer

- 24 months - Full time temporary position in Polytechnic School of University of Orleans

- ❑ Lecturer and developer of the Fluid dynamics and Computer Science courses.
  - Theoretical and numerical fluid dynamics (Fluent, Gambit, Digital Wind tunnel), Tutorials in fluid dynamics (testbeds and wind tunnels),
  - Aerotechnics,
  - Computer science and numerical mathematics,
  - Industrial tutorials:
    - o Helicopter rotor wake simulation (with ONERA financial support – 40k€),
    - o Development of a simulation tool for rotor wake interaction in helicopters and wind turbines,
    - o Lightweight aircraft design (with Wichita State University),

- ❑ Head of mini UAV (unmanned aerial vehicle) design team at Orleans University: ONERA (French aeronautics and space research centre) and DGA (the French Arms Procurement Agency, of the Ministry of Defence) organized an International Universities mini UAV competition, opened to engineering schools and universities.
  - Team with two Lecturers and 16 students from 2 Engineering schools.
  - 2003: Team awarded grant money (40 k€) for the technical feasibility and operational interest presented in the definition report.
  - 2004: prototype of the vehicle without optical nor laser sensors.

1999-2002   Fluid dynamics research engineer

- 36 months - Full time temporary position at CNRS, Orleans, for PhD preparation.

- ❑ Development of an unsteady approach for curved and swept lifting lines numerical computation
  - After having reviewed main works about lifting-line and numerical treatment of Hadamard's sens finite part integrals, we expose an implicit formulation of a steady lifting line for curved and swept wings. We first compare our results with Prandtl's lifting line theory and then validate them with a lifting surface method. We show good accordance in terms of vorticity even with highly curved wings.
  - An application is shown in a configuration closed to helicopter rotor to show feasibility of our approach to this critical case.
  - We propose an implicit method for unsteady curved and swept lifting line time-marching numerical computation. A numerical implementation is drawn in the most critical case of the instantaneous gust entry. The results, even for highly curved wings, are consistent relative to time discretization with good accordance with unsteady high level lifting surface methods.
  - 2 Publications in international Journals (Computational Mechanics, 2002, 2006).
  - 1 presentation during international conference (2005).
  - 3 presentations during national conferences (2001, 2003, 2005).
  - 2 research contracts with ONERA (15 k€ & 60 k€).

- ❑ Computational Fluid Dynamics instructor
  - ENSICA (Engineering school in the aerospace fields), Toulouse.
  - ESEM (Engineering school in the materials and energetics fields), Orleans.

Technical and Linguistic Skills

- ❑ English: fluent.
- ❑ French mother tongue.
- ❑ Russian: spoken, read.

- ❑ MS Windows & Office (all versions), Linux (Mandriva), OpenOffice. Fortran (77/90), C, LaTeX.
- ❑ Calculation software Expert: Fluent, Gambit, Digital Wind Tunnel...
- ❑ Data analysis and acquisition software: Techplot, SigmaPlot, MatLab, Labview...
- ❑ CAD: Catia V5 R14, SolidWorks, ME10 (2D)