

# Julien VANHAREN

Ph.D. in Computational Fluid Dynamics

## PERSONAL DATA

PLACE AND DATE OF BIRTH: Soissons, France | July 31, 1989  
CITIZENSHIP: French  
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EMAIL: [julien.vanharen@inria.fr](mailto:julien.vanharen@inria.fr)  
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## PROFESSIONAL EXPERIENCE

OCT 2022 | Research fellow  
[Inria Saclay](#) in Palaiseau, France  
*Meshing, anisotropic mesh adaptation and high-order numerical methods*  
Anisotropic unstructured mesh adaptation. Numerical schemes for Computational Fluid Dynamics (CFD). Reynolds-Averaged Navier-Stokes (RANS) and Large Eddy Simulation (LES). High Performance Computing.

JUN 2020 | Research engineer  
SEP 2022 | [ONERA](#) in Châtillon, France  
*CEDRE developer*  
CEDRE is a multi-physics platform working on general unstructured meshes intended to both advance research and process industrial applications in the fields of energetics and propulsion. High-order and high-fidelity numerical methods. High Performance Computing optimization.

MAY 2017 | Postdoctoral fellow  
MAY 2020 | [Inria Saclay - Île-de-France](#) in Palaiseau, France  
*Time-accurate anisotropic mesh adaptation for fluid-structure interaction (FSI) simulations*  
Implementation and validation of the Finite Element method for the unsteady linear elasticity equations. Coupling with a code solving the Euler equations based on the Finite Volume method. Development of error estimates for fluid-structure interaction applied to unsteady anisotropic mesh adaptation. Project RAPID funded by Direction Générale de l'Armement (DGA).

## EDUCATION

MAY 2014 | Ph.D. in Computational Fluid Dynamics  
APR 2017 | [AIRBUS](#) & [Université de Toulouse](#) in Toulouse, France  
*High-order numerical methods for unsteady flows around complex geometries*  
Collaboration between AIRBUS and CERFACS. Several numerical methods and codes are investigated for industrial applications. The coupling with a nonconforming grid interface of high-order schemes for structured and unstructured zones in elsA. The Spectral Difference Method in JAGUAR. The Lattice Boltzmann Methods in ProLB.

JUL 2016 | Argonne Training Program on Extreme-Scale Computing (ATPESC)  
AUG 2016 | [Argonne National Laboratory \(ANL\)](#) in Lemont, IL, USA  
*Intensive, two-week training on the key skills, approaches, and tools to design, implement, and execute computational science and engineering applications on current high-end computing systems and the leadership-class computing systems of the future*  
Computer architectures and predicted evolution. Numerical algorithms and mathematical software. Approaches to building community codes for HPC systems. Data analysis, visualization, I/O, and methodologies and tools for big data applications. Performance measurement and debugging tools.

SEP 2012 | M.Sc. Fluid Dynamics  
JUN 2013 | [ISAE-SUPAERO](#) in Toulouse, France

SEP 2009 | M.Sc. Aerospace and Aeronautical Engineering  
JUN 2013 | [ISAE-SUPAERO](#) in Toulouse, France

## TEACHING

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OCT 2022	Anisotropic unstructured mesh generation for complex geometries
OCT 2023	Université Paris-Est Créteil (UPEC) in Créteil, France
JUN 2019	Incompressible fluid mechanics [MF102] ENSTA Paris in Palaiseau, France
MAY 2016	Fundamentals to understand and analyze high fidelity compressible Large Eddy Simulation (LES) CERFACS in Toulouse, France

## LANGUAGES

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ENGLISH	Full working proficiency
FRENCH	Native proficiency
GERMAN	Good working knowledge
POLISH	Basic communication skills

## THESIS

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- [17] Julien Vanharen. **High-Order Numerical Methods For Unsteady Flows Around Complex Geometries**. PhD thesis. Université de Toulouse, 2017. [\[PDF\]](#).

## PEER-REVIEWED JOURNAL ARTICLES

- 
- [10] Julien Vanharen, Adrien Loseille, Frédéric Alauzet, and Micheal Andrew Park. **Nearfield anisotropic mesh adaptation for the third AIAA Sonic Boom Workshop**. *J. Aircr.* (2022). [\[10.2514/1.C036502\]](#).
- [13] Julien Vanharen, Adrien Loseille, and Frédéric Alauzet. **Non-manifold anisotropic mesh adaptation: application to fluid-structure interaction**. *Eng. Comput.* (2021). [\[10.1007/s00366-021-01435-2\]](#).
- [18] Julien Vanharen, Guillaume Puigt, Xavier Vasseur, Jean-François Boussuge, and Pierre Sagaut. **Revisiting the spectral analysis for high-order spectral discontinuous methods**. *J. Comput. Phys.* 337 (2017), 379–402. [\[10.1016/j.jcp.2017.02.043\]](#).
- [21] Julien Vanharen, Guillaume Puigt, and Marc Montagnac. **Theoretical and numerical analysis of nonconforming grid interface for unsteady flows**. *J. Comput. Phys.* 285 (2015), 111–132. [\[10.1016/j.jcp.2015.01.013\]](#).

## PEER-REVIEWED CONFERENCE PAPERS

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- [1] Gabriel Barreau, François Pechereau, Benjamin Khier, Philippe Lalande, Guillaume Puigt, Julien Vanharen, and Frédéric Alauzet. **Semi-implicit scheme for modelling the fluid dynamics part of a DC-powered arc**. *Aerospace Europe Conference 2023 - 10<sup>th</sup> EUCASS - 9<sup>th</sup> CEAS*. Lausanne, Switzerland, 2023. [\[PDF\]](#).
- [4] François Pechereau, Fabien Tholin, Julien Vanharen, Guillaume Puigt, Frédéric Alauzet, and Philippe Lalande. **3D modeling of an arc in interaction with a composite panel**. *Aerospace Europe Conference 2023 - 10<sup>th</sup> EUCASS - 9<sup>th</sup> CEAS*. Lausanne, Switzerland, 2023. [\[PDF\]](#).
- [7] Frédéric Alauzet, Francesco Clerici, Adrien Loseille, Matthieu Maunoury, Lucien Rochery, Cosimo Tarsia-Morisco, Lucille-Marie Tenkes, and Julien Vanharen. **4<sup>th</sup> AIAA CFD High Lift Prediction Workshop results using metric-based anisotropic mesh adaptation**. *AIAA Fluid Dynamics Conference*. Chicago, IL, USA, 2022. [\[10.2514/6.2022-3521\]](#).
- [8] Frédéric Alauzet, Francesco Clerici, Adrien Loseille, Cosimo Tarsia-Morisco, and Julien Vanharen. **Some progress on CFD high lift prediction using metric-based anisotropic mesh adaptation**. *AIAA Scitech Forum*. San Diego, CA, USA, 2022. [\[10.2514/6.2022-0388\]](#).
- [11] Lucille-Marie Tenkes, Frédéric Alauzet, and Julien Vanharen. **Hybrid anisotropic mesh adaptation using metric-orthogonal approach**. *AIAA Scitech Forum*. Virtual Event, 2021. [\[10.2514/6.2021-1779\]](#).
- [14] Julien Vanharen, Adrien Loseille, Frédéric Alauzet, and Michael Andrew Park. **Nearfield anisotropic mesh adaptivity for the third AIAA sonic boom workshop**. *AIAA Scitech Forum*. Virtual Event, 2021. [\[10.2514/6.2021-0347\]](#).
- [15] Julien Vanharen, Rémi Feuillet, and Frédéric Alauzet. **Mesh adaptation for fluid-structure interaction problems**. *AIAA Fluid Dynamics Conference*. Atlanta, GA, USA, 2018. [\[10.2514/6.2018-3244\]](#).

## CONFERENCES AND SEMINARS

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- [2] Cosimo Tarsia Morisco, Lucille-Marie Tenkes, Julien Vanharen, and Frédéric Alauzet. **Gradients evaluation in mixed-element meshes**. *IACM - CFC 2023*. Cannes, France, 2023.
- [3] Cosimo Tarsia Morisco, Julien Vanharen, and Frédéric Alauzet. **Vertex-centered MEV MUSCL scheme in mixed-element meshes**. *CSME - CFD-SC 2023*. Sherbrooke, QC, Canada, 2023.
- [5] Julien Vanharen, Cosimo Tarsia Morisco, and Frédéric Alauzet. **7<sup>th</sup> AIAA CFD Drag Prediction Workshop results using anisotropic mesh adaptation**. *CSME - CFD-SC 2023*. Sherbrooke, QC, Canada, 2023. [\[PDF\]](#).

- [6] Julien Vanharen, Cosimo Tarsia Morisco, and Frédéric Alauzet. **7<sup>th</sup> AIAA CFD Drag Prediction Workshop results using anisotropic mesh adaptation**. IACM - CFC 2023. Cannes, France, 2023. [\[PDF\]](#).
- [9] Eric Quémerais, Bastien Andrieu, Bruno Maugars, Julien Coulet, Stéphanie Lala, and Julien Vanharen. **ParaDiGM: a library to handle Parallel Distributed General Meshes**. 22<sup>nd</sup> ONERA-DLR Aerospace Symposium, ODAS 2022. Hamburg, Germany, 2022. [\[PDF\]](#).
- [12] Julien Vanharen. **Anisotropic mesh adaptation. Theory and applications**. CEA-Cesta seminar. Le Barp, France, 2021.
- [16] Julien Vanharen, Rémi Feuillet, and Frédéric Alauzet. **Mesh adaptation for fluid-structure interaction problems**. 6<sup>th</sup> European Conference on Computational Mechanics (ECCM 6). 7<sup>th</sup> European Conference on Computational Fluid Dynamics (ECFD 7). Glasgow, UK, 2018. [\[PDF\]](#).
- [19] Julien Vanharen, Guillaume Puigt, Xavier Vasseur, Jean-François Boussuge, and Pierre Sagaut. **Comparing the resolution power of standard finite difference and spectral difference schemes**. TILDA - Symposium & Workshop on Industrial LES & DNS. Toulouse, France, 2016. [\[PDF\]](#).
- [20] Julien Vanharen, Guillaume Puigt, Xavier Vasseur, Jean-François Boussuge, and Pierre Sagaut. **Revisiting the spectral analysis for high-order spectral discontinuous methods**. TILDA - Symposium & Workshop on Industrial LES & DNS. Toulouse, France, 2016. [\[PDF\]](#).
- [22] Julien Vanharen, Guillaume Puigt, and Marc Montagnac. **Two-dimensional spectral analysis of nonconforming grid interface. Emphasis on unsteady flows**. 50<sup>th</sup> 3AF International Conference on Applied Aerodynamics. Toulouse, France, 2015. [\[PDF\]](#).