

Dr. SUBHANDU RAWAT

Data Scientist: Computational Physics

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PROFESSIONAL EXPERIENCE

Mercedes-Benz Research & Development Centre

June 2019 - Present

Lead Data Scientist: Autonomous Cars division

- Successfully identified anomalies in autonomous driving assistance system behaviour using *data driven techniques* on huge **Geospatial** real time dataset. Identification of such anomalies helped the system developers to diagnose the issues and improve system performances.
- Developed an application which predict our data base size and helps Daimler to allocate suitable resources. This application is developed from scratch in Python using object oriented framework and utilizes ARIMA model and **RNN (Tensorflow)** for time series forecasting. This application is deployed in *Linux cluster* using **Docker** container.
- Analyze the experimental data gathered in Daimler Wind tunnel in Python using supervised and unsupervised learning utilizing **numpy**, **pandas** and **Scikit-learn** libraries .

Mercedes-Benz Research & Development Centre

January 2017 - June 2019

Subject Matter Expert: Fluids & Aerodynamics group

- Project lead to develop a computational strategy for soiling and rain simulation for ground vehicles. Correlate the CFD results with wind tunnel measurements.
- Improve the accuracy and applicability of Eulerian Lagrangian models through in depth discussions with Siemens AG managerial and development teams in U.K and Germany.
- Design and conduct full vehicle experiments in Daimler AG wind tunnel to study the effect of design changes on the Aerodynamics and its effect on the behaviour of water on the vehicle surface.

RESEARCH EXPERIENCE

Institut de Mécanique des Fluides de Toulouse (C.N.R.S)

December 2011 - July 2016

Multiphase & Turbulence flow group, Toulouse, France

(Research Scientist)

- Achieve drag modulation due to the modification of near-wall self sustained mechanism using microbubbles
- Development of in-house CFD code to simulate turbulent boundary layer and Lagrangian tracking of microbubbles
- Developed dynamical systems understanding of the large-scale dynamics in fully developed turbulent shear flows. Prove the hypothesis that there is a self sustained mechanism in large scale motions
- Understanding laminar-turbulent transition to develop better flow control strategies
- Use data driven methods to search patterns in turbulent attractors

EDUCATION

L'institut National Polytechnique De Toulouse (INPT) - France

Ph.D., Fluid dynamics, Turbulence

January 2015

Thesis - Coherent dynamics of large-scale turbulent motions.

Indian Institute of Science Bangalore (IISc.)- India

Master of Engineering, Aerospace GPA 7/8

December 2010

Thesis - Effect of nonlinearity on the aeroelastic response of a flat plate

SKILLS**Technical Skills**

- Fluid dynamics, **Turbulence**, Multiphase flow, Instability theory, Flow control
- Computational Fluid Dynamics, DNS, LES
- Nonlinear Dynamics, Applied Mathematics, Classical Mechanics, **Data Science**, **Machine learning**

Computational & Softwares Skills

- **Tensorflow**, Channelflow, OpenFOAM, *StarCCM+*, Paraview, **Scikit-learn**
- Matlab, **Python**, C, FORTRAN, **Spark**, **SQL**

PUBLICATIONS

- S. Rawat, C. Cossu and F. Rincon. Relative periodic orbit in Plane Poiseuille flow. *Comptes-rendus Mecanique*, 2014
- S. Rawat, Y. Hwang, C. Cossu and F. Rincon. On the self-sustained nature of large-scale motions in turbulent Couette flow. *Journal of Fluid Mechanics*, 2015
- S. Rawat, C. Cossu and F. Rincon. Travelling-wave solutions bifurcating from relative periodic orbits in plane Poiseuille flow. *Comptes-rendus Mecanique*, 2016
- S. Rawat, C. Cossu and F. Rincon. Exact invariant solutions for coherent turbulent motions in Couette and Poiseuille flows. *Procedia IUTAM*, 2016
- S. Rawat, D. Legendre, E. Climent and R. Zamansky. Numerical simulations of drag modulation by microbubbles in a flat turbulent boundary layer. *Computers and Fluids*, 2018

INTERNATIONAL CONFERENCES

- S. Rawat, C. Cossu and F. Rincon. International Conference on the last achievements in the study of turbulent and transitional flows, ENS Lyon 31 August — 5 Aeptember 2013. *European Turbulence conference, ETC14*
- S. Rawat, C. Cossu and F. Rincon. Coherent structures in fully developed turbulence, Polytechnic University of Madrid, School of Aeronautics: May 20-22, 2015. *Euromech Colloquium 568*
- S. Rawat, C. Cossu and F. Rincon. International Congress of Theoretical and Applied Mechanics, Montreal Canada August 21- 26 2016. *ICTAM 2016*
- S. Rawat, Jae Sung Park, Michael D. Graham and C. Cossu. Large-eddy exact coherent solutions in the turbulent channel. KTH Stockholm Sweden 21-24 August 2017. *European Turbulence conference, ETC16*
- S. Rawat, R. Duggirala, V. Srimali. A Methodology to Simulate Water Stripping Phenomenon in Vehicle Soiling: An Eulerian to Lagrangian Approach. 6th OpenFOAM Conference Hamburg 2018
- S. Rawat Ravi Duggirala, Srinivas.Y and K. Upadhyay. Windshield wiper evaluations for High Speed wipe Quality (HSQ) and Water Pullback performance using OpenFOAM. 7th OpenFOAM Conference Berlin 2019

LANGUAGE

English (Native), French (Intermediate), Hindi (Native), German(Basic)