Potluri Vachan Deep

Ph.D. research scholar, IIT Bombay

vachanpotluri1997@gmail.com +91-773-869-5898 Vachan Potluri

https://vachan-potluri.github.io/

Skills

Programming languages: C++, Python, MATLAB/Scilab
CFD softwares: OpenFOAM, SU2

Education

Ph.D. Mechanical Engineering | IIT Bombay — Jul '18 – present

Thesis title	Development and analysis of discontinuous Galerkin computational framework for high order simulation of hypersonic shock-boundary layer interaction
Key electives	Galerkin Methods for Fluid Dynamics, High Performance Scientific Computing, Magnetohydrodynamics and its engineering applications
CPI	9.86

B.Tech. Mechanical Engineering | IIT Bombay — Jul '14 – Jul '18

CPI	9.72
Key electives	Computational Fluid Dynamics and Heat Transfer, Essentials of Turbulence, Finite Element and Boundary Element Methods, Fuels and Combustion, Numerical Methods for Conservation Laws

Related experience

Development and analysis of discontinuous Galerkin simulation framework for compressible flows

Jul '19 – present

Ph.D. thesis | IIT Bombay

- **Developed a solver** PLENS implementing a subcell limiter using the `deal.II` C++ FEM library
- **Performed an extensive computational study** to demonstrate superior performance of high order solutions in terms of accuracy/DoFs
- **Proposed and validated an extension** of the subcell limiter for its use in hypersonic regime
- **Conducted a restricted performance comparison** of an equivalent solver FLUXO with OpenFOAM and SU2 to demonstrate its better performance in terms of accuracy/cost and accuracy/memory

Development of high resolution schemes for compressible flows in OpenFOAM

Dec '16 – Apr '18

B.Tech. project | IIT Bombay

- **Modified the existing solver** `rhoCentralFoam` to use TVD-RK3 time integration scheme
- **Developed a new solver** `ausmPlusUpFoamRK3` implementing AUSM$^+$-up flux scheme along with TVD-RK3 time integration scheme
- **Performed a comparative study** of these two solvers by performing simulations of several 1D and 2D test cases to draw conclusions relevant to the flux schemes

Other experience

Unified 2D Finite Element development

Mar '18 – Apr '18

Course project | IIT Bombay

- **Implemented a subroutine** in FORTRAN77 library FEAP for a new combined Plane Stress, Plain Strain and Axi-symmetric linear Elasto-static element, and validated the subroutine using simple test cases

Stair climbing wheel chair

Jul '17 – Dec '17

Course project | IIT Bombay

- **Proposed a mechanism** for a passive wheel chair capable of climbing stairs using the force provided by a companion
- **Built a full-scale basic functioning prototype** in 2 months, constraining to the allotted budget and resources
- **Demonstrated the prototype effectiveness** on 2 different stair geometries to Mechanical Engineering Department faculty, staff, and other students

GE90 HPC airfoil durability analysis
May '17 – Jul '17

Internship | John F. Welch Technology Center, General Electric

- **Modified** existing mesh of GE90-115B high pressure compressor stage-9 rotor blade, to model
  1. Three types of damaged blades by making notches at different locations on the leading edge
  2. A defectively manufactured blade by changing thickness of leading edge according to manufacturing tolerance
- **Generated Campbell Diagrams** by simulating the vibration response in ANSYS and **recalculated fatigue factor of safety** at critical locations of undamaged, damaged and defected blades for 3 different materials

Publications

Journal articles

[1] V. D. Potluri, B. P. Puranik, and K. V. Bodi. "High order discontinuous Galerkin simulation of hypersonic shock-boundary layer interaction using subcell limiting approach". In: *Journal of Computational Physics* 485 (2023), p. 112117.

[2] V. D. Potluri, B. P. Puranik, and K. V. Bodi. "The effect of basis polynomial degree on the performance of discontinuous Galerkin simulations of compressible flows". In: *Computers & Fluids* (In review).

Conference proceedings

[1] V. D. Potluri, B. P. Puranik, and K. V. Bodi. "Effect of polynomial degree on discontinuous Galerkin simulation of Euler equations". In: *24th International Shock Interaction Symposium*. Springer Nature, 2022.

[2] V. D. Potluri, B. P. Puranik, and K. V. Bodi. "A performance comparison of OpenFOAM, SU2 and FLUXO for simulation of shock boundary layer interaction". In: *14th Asian Computational Fluid Dynamics Conference*. Submitted.

Honours

- Awarded **Prime Minister's Research Fellowship** (PMRF) to pursue Ph.D. in high order numerical methods for hypersonic flows — May '18
- **Stood 2nd in Department** in B.Tech. among a batch exceeding 150 students — May '18
- **Scored 829** in Graduate Aptitude Test in Engineering (GATE) 2018 — Mar '18
- **Secured All India Rank 129** in JEE Advanced 2014 in general category — May '14
- Awarded **Kishore Vigyanik Protshahan Yogana** (KVPY) fellowship by Indian Institute of Science (IISc), Bangalore — Dec '13
- **Secured position among top 1% students** of former Andhra Pradesh who appeared for National Standard Examination in Physics (NSEP) — Dec '13

Extracurricular activities

- **Grade 8 Piano musician** certified by Trinity College London — May '12
- **Grade 6 Guitar musician** certified by Trinity College London — May '11