CHANDAN PAUL

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Educational Qualifications

Year	Degree	Institution	CGPA/ %	Rank
2013-Till date	PhD	Pennsylvania State University	3.95/4	-
2011-2013	Masters degree (Mechanical Engineering	IIT-Kanpur (India)	9.5/10	2/20
2001-2005	Bachelors Degree (Mechanical Engineering)	Bengal Engineering and Science University, Shibpur (BESU, India)	82.6%	4/70

Awards and achievements

- Awarded **Academic Excellence Award** (2013) in IIT Kanpur for excellent academic performance.
- Awarded **Institute Alumni Scholarship** for consecutive three times (2002-04) in BESU.
- Ranked within top 0.23% in GATE 2011 (India) examination among 82000 students and got MHRD scholarship.
- Ranked within top 0.26% in State Engineering entrance examination (WBJEE 2001, India) among 3 lac students.

Experience

- July 2010- July 2011: Lexmark International as Software designer and developer (India).
- August 2005-July 2010: Tata Consultancy Services (TCS) as Software designer and developer (India, UK and Malaysia).

Publications

- Chandan Paul, M.K. Das, and K. Muralidhar, Three-dimensional simulation of pulsatile flow through a porous bulge, Transport in Porous Media, 28 pages, available online (2015).
- Vishal Agarwal, Chandan Paul, M.K. Das, and K. Muralidhar, Effect of coil embolization on blood flow through a saccular cerebral aneurysm, accepted for publication in Sadhana (Springer) (2015).

Conference

- C. Paul, A. Sircar, A. Imren, S. Ferreyro-Fernandez, S.P. Roy, W. Ge, D.C. Haworth, M.F. Modest, Radiative Heat Transfer and Turbulence-Radiation Interactions in a Heavy-Duty Diesel Engine, Eastern States Section of the Combustion Institute (March 2016), Hosted by Princeton University.

Present work (PhD):

Adviser: Dr. Daniel Haworth

Description: Present work deals with simulation of turbulent combustion process in an IC engine. In this work the effect of moving piston is captured using deforming mesh. Hybrid Lagrangian particle/Eulerian mesh (LPEM) algorithms are used for this simulation. OpenFOAM (Eulerian approach) is coupled with in house PDF (probability density function based Lagrangian method) code to solve the governing equations of a reacting system. Continuity and Navier-Stokes equation is solved in the OpenFOAM side to get the velocity field; while energy equation and species conservation equations are solved using a particle tracking method in PDF code. Main characteristics of this work are:

(i) Deforming mesh is used for piston movement. A mapfield approach is used near TDC (top dead

center) to deal with bad quality grids.

(ii) OpenFOAM (open source code written in C++) is used to solve velocity field. The PDF code (written in FORTRAN) is responsible for solving energy equation and species conservation equations. RANS is used for turbulence modeling.

(iii) For the time being a simple spray model (as part of OpenFOAM) is used for nHeptane injection. Down the line this model will be improvised to match realistic combustion in an IC engine.

Master's thesis

Title: Pulsatile flow in porous media with applications in aortic and cerebral aneurysms.
Adviser: Dr. K. Muralidhar and Dr. M. K. Das
Description: The work deals with the modeling of following three cases:

(i) Atherosclerosis, the plaque formation in arteries, is modeled with pulsatile flow through a tube filled with porous medium. Analytical investigation of pulsatile flow through a tube filled with porous medium has been carried out. The effect of different flow parameters (Womersley number, Darcy number, Reynolds number and inertia coeffcient) on phase difference between pressure gradient and axial velocity is presented.

(ii) Plaque formation in AAA is modeled with pulsatile flow through a tube with bulge filled with porous medium. Numerical simulation of this case has been carried out and variations of field variables are documented. A comparative study of pulsatile flow between clear medium and porous medium is presented for different flow parameters.

(iii) Coil embolization treatment of patient specific cerebral aneurysm is modeled considering coils as porous medium. Numerical simulation is carried out where both clear and porous medium momentum equations are solved together. The effects of coils embolization on flow field variables are reported. A multi-scale modeling approach (0D) is incorporated to achieve a realistic outflow boundary condition.

The characteristics of the numerical solver are:

- For discretization 3D Finite volume method (FVM) is used on unstructured tetrahedral cells.
- The complete numerical code is written in C++ and parallelized using shared memory framework of OpenMP.

Bachelor's project

Title: Heat transfer and pressure drop characteristics of regularly-spaced twisted-tape-generated laminar swirl flow and strip-inserted laminar flow through non-circular ducts.
Adviser: Dr. S. K. Saha
Description: In this work a review has been carried out on twisted tapes and strip insertions. Existing numerical and analytical solutions available in literature has been studied for circular and non-circular ducts. An experimental setup has been proposed for rectangular duct to examine and compare the heat transfer and pressure drop characteristic between twisted-tape-generated laminar swirl flow and strip-inserted laminar flow.

Technical skills (Mechanical Engineering)

- OpenFOAM
- Proficient in using MATLAB, TECPLOT.
- Sound knowledge in **C, C++, FORTRAN and Java.**
- Sound knowledge in MPI programming.
- Familiar with ANSYS tools (ICEM, GAMBIT and Fluent).
- Conversant with subjects like **Software Design and Development, Data Structures.**
- Equally conversant with both Windows and Linux OS. Also, conversant with shell scripts.
- SCJP (Sun certified java programmer) certification.

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