

Computational Cardio-Vascular Fluid Flow Dynamics (CCVFD)

Overview: Recently, medical practitioners/researchers have started using simulation tools to assist in predicting the behaviour of circulatory blood flow inside the human body in clinical setups. Computational simulations provide invaluable information that is extremely difficult to obtain experimentally and is one of the many CFD sample applications in the biomedical area in which blood flow through an abnormal artery can be predicted. CFD analysis is increasingly performed to study fluid phenomena inside the human vascular system. Medical simulations of circulatory function offer many benefits. They can lower the chances of postoperative complications, assist in developing better surgical procedures, and deliver a good understanding of biological processes, as well as more efficient and less destructive medical equipment such as blood pumps. Furthermore, medical applications using CFD have expanded not only into the diseased clinical situation, like in dealing with cardio-vascular diseases like atherosclerosis, aneurysm, cardio-Myopathy, congenital heart disease etc. but also into health life supportives, such as sport medicine and rehabilitation. There are many advantages when considering CFD. Theoretical development in the computational sciences focuses on the construction and solution of governing equations and the study of various approximations to these equations. CFD complements experimental and analytical approaches by providing an alternative cost-effective means of simulating real fluid flow, particularly in human body fluids. CFD has the capacity to simulate flow conditions that are not reproducible during experimental tests found in biological fluid dynamics, such as scenarios that are too huge, too remote, or too small to be simulated experimentally. It is highly desirable to have a course that can introduce the application of Computational Methods in solving problems from Cardio-Vascular Fluid Flows. As such there is only limited exposure of this topic to students and researchers in India and it is highly desirable, especially in Indian context, to come up with such a course content. The proposed course is aimed at meeting such a demand.

Course Details	
Course Title	CCVFD
Dates	Feb 6 – 11, 2017
Host Institute	IIT Kanpur
No. Of Credits	1
Max No. Of Participants	50
Eligibility	1) You are a Scientist/ CFD Engineer with specific interest in Bio-Fluid Mechanics 2) You are involved in the design of cardiovascular prosthetics such as, VAD, ECMO etc. 3) you are a student or faculty from academic institution interested Cardio-Vascular Fluid Mechanics 4) Doctors with a reasonable liking for Applied Mathematics
Registration	Registration Fees: The participation fees for taking the course is as follows: Student Participants: Rs.2000 Faculty Participants: Rs.5000 Government Research Organization Participants: Rs.10000 Industry Participants: Rs.12000 The above fee is towards participation in the course, the course material, computer use for tutorials and assignments, and laboratory equipment usage charges. Mode of payment: Demand draft in favour of "Registrar, IIT Kanpur" payable at SBI, IIT Kanpur
Accommodation	The participants may be provided with hostel accommodation, depending on the availability, on payment basis . Request for hostel accommodation should be sent to contact address.
Contact Details	Prof. B. V. Rathish Kumar, Co-ordinator, FB-555, Department of Mathematics & Statistics, IIT Kanpur Email: ccvfd.2017@gmail.com Phone:0091-512-259-7660/7636 Fax: 0091-512-259-7500
Important Dates	Last Date for Registration: Jan 02, 2017 Selection List Announcement Date: Jan 06, 2017

Course Faculty

Professional Details



Prof. K.B. Chandran

Prof. K B Chandran is currently working as Emeritus Professor at the University of Iowa. He held Lowell G. Battershell Chair in Biomedical Engineering and was professor and chair of biomedical engineering till 2014. Prof K B Chandran has produced about 18 doctoral students and 18 master's graduates. To his credit he has published 4 books, 6 book chapters and owns a patent. He has published 135 manuscripts in archival journals and 270+ presentations in conferences. He is invited as a plenary speaker in a number of prestigious conferences. He has received several honours including Fellow of ASME, BES and AIMBE. His lucid book on the "Biofluid Mechanics--The Human Circulation," is very popular. He has applied the principles of Mechanics (both solid and fluid) to understand artificial heart valves, ventricular assist devices, vascular grafts etc, to benefit the man kind.



Prof. B. V. Rathish Kumar
Course Co-ordinator

Prof B V Rathish Kumar is currently Professor in the Department of Mathematics and Statistics at IIT Kanpur. He has made seminal contributions through the development of Numerical Methods for solving PDEs. He developed high performance computing strategies using parallel algorithms. He has designed and developed a wide spectrum of numerical solvers that employ Finite element, Finite volume and Wavelet based techniques for solving fluid dynamics, biomechanics problems of interest to both nature and technology.



Prof. B.S.V. Prasad Pattnaik

Prasad Patnaik BSV is currently Professor in the Department of Applied Mechanics at IIT Madras, Chennai. He specializes in the development of CFD tools for fluid-structure interaction in a variety of problems ranging from vortex induced vibrations to filament FSI in micro-flows. His current interests are in FSI application to the human circulatory systems using both mesh based and meshfree simulations.