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*International Workshop*

*on*

## MESHFREE PARTICLE METHOD FOR SOLVING FLUID DYNAMICS PROBLEMS

DECEMBER 18-22, 2017

*Hosted By*

DEPARTMENT OF MATHEMATICS



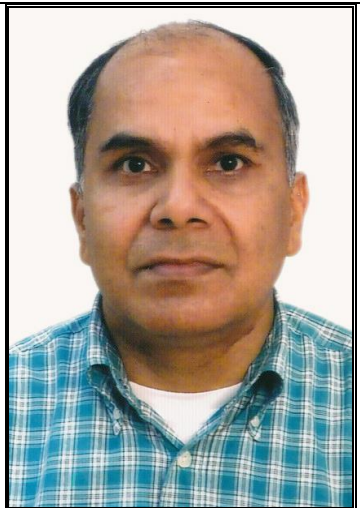
राष्ट्रीय प्रौद्योगिकी संस्थान कालिकट

NATIONAL INSTITUTE OF TECHNOLOGY CALICUT

In this course, we intend to introduce our own developed meshfree particle method, called Finite Pointset Method (FPM). FPM has been developed in the last 18 years in collaboration with the Fraunhofer Institute for Industrial Mathematics, Kaiserslautern, Germany. It has been successfully applied in several industrial problems. FPM is a Lagrangian meshfree particle method for solving fluid dynamic equations. In the FPM framework, the spatial differential operators at each particle position are approximated from its surrounding clouds of particles with the help of the weighted least squares method. In this sense, FPM is a generalized finite difference method. We present the solution methods for hyperbolic, elliptic and parabolic equations in one and two space dimensions. Moreover, we introduce the free surface flow simulation algorithm, granular and pedestrian flows. The participants will develop the algorithms in Matlab.

### INTERNATIONAL COURSE FACULTY

**Dr. Sudarshan Tiwari** is one of the well-known research scientists in the area of particle methods. Dr. Tiwari completed PhD in applied mathematics from TU Kaiserslautern, Germany under the supervision of Prof. Helmut Neunzert. Currently, he is working at the same University. He has published several research papers in the international journals in the numerical methods for PDEs.



### COURSE MODULE

- Module-1** : Derivation of conservation laws. Reconstruction of a function by the moving least squares method. Computation of spatial derivatives of a function by a meshfree method.
- Module-2** : Meshfree schemes for 1d Burger's equation, 1d Shallow water equations, 1d compressible Navier-Stokes equations.
- Module-3** : Meshfree discretization of elliptic boundary value problems in one/two space dimensions.
- Module-4** : Meshfree particle scheme for solving incompressible Navier-Stokes equations for simple channel flows.
- Module-5** : Extension for particle scheme for free surface flows.
- Module-6** : Modeling and simulations of interacting particle systems (granular and pedestrian flows).

There will be lab session every day, and at the end of the modules, an examination will be conducted.

### WHO CAN PARTICIPATE

- Students (UG/PG/PhD) and faculty members from all academic institutions.
- Scientists/Technologists/Engineers, and others from the industry, private/government services, NGO and research institutions.

### HOW TO APPLY

Applicants have to first register in the GIAN portal at the site <http://www.gian.iitkgp.ac.in/GREGN/register> (Those already registered need not register again).

Using the user id and the password thus generated through this registration you can proceed for course registration in the portal. Select this course from the courses available in the portal and follow the instructions to register for it. You also have to email your details to the course coordinator in the mail id: [satyanand@nitc.ac.in](mailto:satyanand@nitc.ac.in). You will be intimated about your selection by email by the course coordinator.

Once selected you have to pay the course fee online by Net Transfer or by Credit/Debit card to the following account

### COURSE FEE

Participants from Abroad	: US \$ 200
Industry/Research organizations	: Rs. 6000/-
From Academic Institutions	
Students (UG/PG/PhD)	: Rs. 1000/-
Teachers	: Rs. 3000/-

The above fee includes, computer use for tutorials and assignment and free internet facility.

The participants will be provided accommodation on payment basis (subject to availability and on first come first serve basis) in the institute hostel and guest house.

Account Name	: Director, NIT Calicut, GIAN
Account No	: 37154522972
Bank Name	: SBI, CREC Branch, Chathamangalam
Branch Code	: 002207
IFSC Code	: SBIN0002207

### DATES TO REMEMBER

Online registration	: October 1, 2017
Intimation of selection	: November 30, 2017
Course fee remittance	: December 1, 2017

### HOST FACULTY AND COURSE COORDINATOR

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