



ICTS

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TATA INSTITUTE OF FUNDAMENTAL RESEARCH

## **ICTS Seminar**

- Title : Systematic collective flow manipulation by an array of wind turbines
- Speaker : Shreyas Mandre, Brown University, USA
- Date : Wednesday, February 6, 2019
- Time : 3:00 PM
- Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore
- Abstract : Turbines placed in the wake of upstream turbines perform poorly because power extraction by the upstream turbine leaves the wake depleted of kinetic energy. To circumvent this performance deterioration, we consider the turbine array to collectively manipulates the flow such that the wake is deflected away from downstream turbines and undepleted flow is incident on them. I will present a mathematical abstraction of such a ``deflector-turbine" array in two-dimensional inviscid flow. Through analysis of the inviscid flow, we find that a ``deflector" is any element that introduces bound vorticity in the flow without shedding free vorticity, and a ``turbine" is any element that continually sheds equal and opposite amounts of free vorticity in the flow. Using our mathematical model, we will develop the design principles and performance characteristics of the deflector-turbine array