

In-Stream Hydrokinetic Turbines for Sustainable Energy Conversion

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Energy production from renewable sources as wind, rivers or tidal streams poses new challenges as compared to conventional hydro-power or fossil-fuel plants. Not only the flow impinging on the energy extracting device is varying in time but also the boundary conditions may be subject to slow variations. One example is the scour-depositional patterns occurring around in-stream horizontal axis turbines in rivers, the effect of migrating sediment waves approaching the turbine rotor plane, and the morphodynamic equilibrium of the river bed around turbine arrays. However, such an interaction is not necessarily problematic and could actually be functional for a better management of fluvial systems subject to excessive erosion. In the course of this seminar I will present some of my latest research using basic, fundamental fluid mechanics and laboratory experiments on wind and fluvial turbines to envision and model sustainable and renewable energy systems.

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