Abstract Submitted
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Study of the turbulent wake behind a tidal turbine through different numerical models[1] AMIR TEYMOUR JAVAHERCHI MOZAFARI, ALBERTO ALISEDA, SYLVAIN ANTHEAUME, JOSEPH SEYDEL, BRIAN POLAGYE, University of Washington — As developing sources of renewable energy becomes a critical priority, research in this field become more essential. A novel method to produce clean renewable energy is extraction from ocean tides via a turbine. Although energy generation from tidal currents has many similarities to wind, the balance between kinetic and potential energy is a key element in tidal channels that invalidates "Betz's" limit. Other practical differences arise from the concentrated nature of tidal resources which impose very close turbine spacing for economic reasons. These, together with the potential influence of geometric constraints imposed by free surface and tidal channel walls, makes the study of the turbulent wake in tidal energy extraction a very important problem in development of this technology from economical and environmental aspects. We will present numerical simulations of turbulent wake behind a well characterized two-bladed turbine using a hierarchy of different models: Actuator Disk, Virtual Blade, the Single and Multiple Reference Frame and Sliding Mesh model with various boundary conditions and inlet velocity profiles. We will compare the results, discuss the differences among these models and the potential for each one to answer questions about optimization of energy extraction and environmental impacts.

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