Hydrodynamic interaction of an offshore floating support structure and tidal energy converter

Introduction
Recent developments in the tidal energy conversion industry have led to the development of floating support structures for tidal turbines. An advantage of floating systems is good accessibility for inspection and maintenance of the turbines. Furthermore, a floating platform has compliant characteristics, which potentially reduces fluctuations in power output and turbine thrust forces.

The hydrodynamic interaction between the floating platform and the turbines is a key issue in the design of floating tidal energy systems. The control system of the turbines responds to fluctuations in inflow by changing the rotational velocity or blade pitch angles of the rotor. This results in a fluctuating thrust force of the turbine. For a floating platform, the control system will also respond to platform motions induced by waves. This coupling provides an extra challenge for determining the motions of the platform and the response of the turbines. The interaction between the floating platform, control system and turbine dynamics cannot be addressed separately; an integral solution to predict motions and loads on the platform and turbines is required.

Aim
This research focuses on the development of a coupled dynamic model by integrating the turbine and control system behaviour with a hydrodynamic model of a floating tidal energy conversion platform.

Committee Chairman:
Prof. Dr. A. Metrikine
☎: +31 (0)15 27 84749
@: A.Metrikine@tudelft.nl

University Supervisor:
Ir. Antonio Jarquin Laguna
☎: +31 (0)15 27 88030
@: A.JarquinLaguna@tudelft.nl