Characterization of the Fluid-Structure Interaction on a Vertical Axis Turbine with Deformable Blades

Abstract

In this thesis, the fluid-structure interaction (FSI) on a vertical-axis water turbine (VAWT) with flexible blades is investigated using both numerical and experimental investigations.

A numerical study is presented, after a short overview of the peculia   VAWT current state of the investigations in FSI on VAWT is given. This numerical approach is based on the open source toolbox foam-extend. The code is evaluated and its functionality is extended. The simulation of an oscillating profile with strong deformations, including two-way coupling, is carried out by way of example with simplified fluid properties and without consideration of the composite materials. Although the complexity of the setup could not be   ,   provide an outlook for the potential and the limitations of a numerical approach.

In the experimental investigations, the complex multi-physical interactions in the rotor of a