

Sail Milling

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INTRODUCTION

The group has been requested by Hundested Propeller A/S (HP) to verify and expand their calculations on "sail milling". The idea is to utilise the potential energy source in the water flowing past a controllable pitch propeller when a sailing vessel is powered by its sail. Thereby reducing the fuel consumption and the CO₂-emissions.

Some preliminary estimates has been made by HP, based mainly on propeller diagrams. However, the estimates are expected to be subject to great uncertainties, due to the propeller being optimized for propulsion, rather than milling.

PROJECT CONTENTS

This project includes a scale experiment, a 3D analysis of the vortex system around the propeller blades, a Blade Element Momentum analysis, and estimates based on data for standard Wageningen propeller series. Furthermore, OSK Shiptech has agreed to model the experiment with CFD.

The purpose is to determine the relationship between relative velocity and power generation through a combination of several models and compare the result to the estimates made by HP. The possibility of optimizing the efficiency through expansion of the blade pitch range will also be explored.

The possible complications related to this project include the risk of cavitation and increased noise and vibration levels in the milling condition. It is not expected that any of these points will prove to cause major, unsolvable problems.

RESULTS AND FURTHER PERSPECTIVES

As the project is not finished at the deadline of this abstract, the results are not yet known. Given the successful result, sail milling will be a viable, environmentally friendly way of generating power aboard sailing vessels, at the cost of a minor loss of speed.

The method may even be possible to implement on fuel powered vessels when these are in the process of slowing down. This can provide a green source of electricity aboard the vessel, taking advantage of the kinetic energy accumulated in a vessel at speed. Energy that is otherwise wasted.