Accepted Manuscript

The study on the morphing composite propeller for marine vehicle. Part I: Design and numerical analysis

Fanlong Chen, Liwu Liu, Xin Lan, Qinyu Li, Jinsong Leng, Yanju Liu

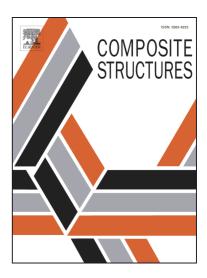
PII: S0263-8223(16)31964-X

DOI: http://dx.doi.org/10.1016/j.compstruct.2017.02.072

Reference: COST 8294

To appear in: Composite Structures

Received Date: 25 September 2016
Revised Date: 25 January 2017
Accepted Date: 13 February 2017



Please cite this article as: Chen, F., Liu, L., Lan, X., Li, Q., Leng, J., Liu, Y., The study on the morphing composite propeller for marine vehicle. Part I: Design and numerical analysis, *Composite Structures* (2017), doi: http://dx.doi.org/10.1016/j.compstruct.2017.02.072

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

The study on the morphing composite propeller for marine vehicle. Part I:

Design and numerical analysis

Fanlong Chen^{1,#}, Liwu Liu^{1,#}, Xin Lan², Qinyu Li¹, Jinsong Leng², Yanju Liu^{1,*}

¹Department of Astronautical Science and Mechanics, Harbin Institute of Technology, Harbin 150001,

People's Republic of China

²Centre for Composite Materials and Structures, Harbin Institute of Technology, Harbin, 150080, People's Republic of China

*Corresponding authors: yj_liu@hit.edu.cn

#These authors contributed equally to this work.

Abstract: This paper details a novel morphing composite propeller (MCP) to improve the performance for marine vehicles (MVs). A MCP is designed with an active rotatable flap (ARF) to change the blade's local camber with flap rotation. A piezo-stack actuator has been connected with one transmission mechanism housed in the propeller blade to push the ARF to obtain various configuration of the MCP. A commercial Finite Element (FE) software ANSYS Fluent was employed to analyse and simulate the hydrodynamics around the propeller with the ARF ranging from -5° to +5° and the advance speeds ranging from 1.08 to 2.52 m/s. Finally, the FE results has been used to predict improved performances of the MCP and found the morphing composite propeller configuration has improved the efficiency by 1.1% while improving the structural durability.

Keywords: smart structure, morphing composite propeller, marine vehicles, transmission mechanism, hydrodynamic analysis, structure responses.

Download English Version:

https://daneshyari.com/en/article/4912168

Download Persian Version:

https://daneshyari.com/article/4912168

<u>Daneshyari.com</u>