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Traditional catamaran hull form configurations that reduce total resistance

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Abstract

Catamaran resistance is very complex compared to monohull resistance, so it is particularly worthy of research. The below-water-level hull form influences the fluid flow characteristics around the ship, which either increases or decreases the total resistance. This study focuses on developing a new hull form by using the Lackenby Method to modify an existing hull form in such a way that reduces the total resistance. The total resistance was calculated using computational fluid dynamics, since the Navier-Stokes equation is built into the Tdyn software. The research results show that hull form changes can in fact decrease or increase the ship's total resistance. The best new hull form was chosen for its value of least total resistance. © IJTech 2017.

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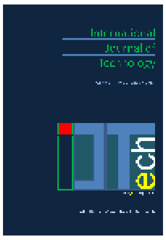

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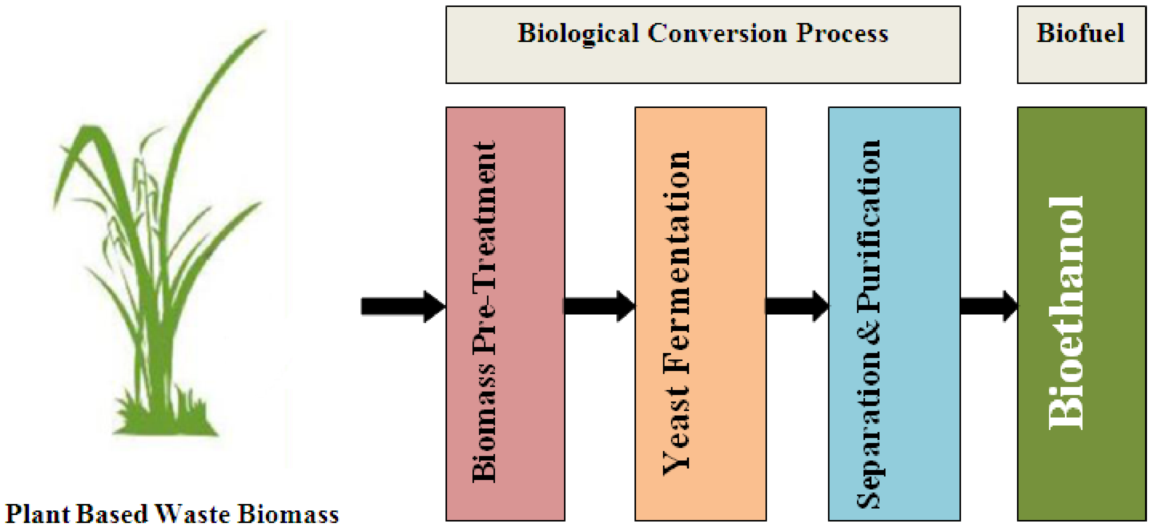

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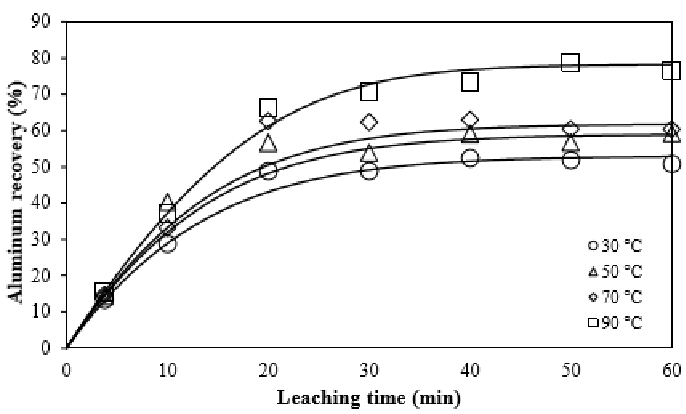

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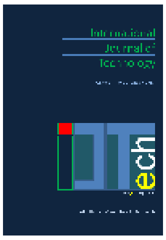

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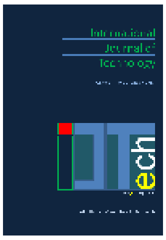

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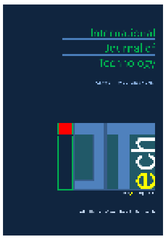

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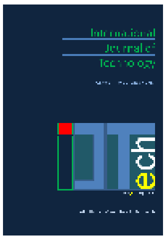

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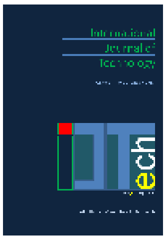

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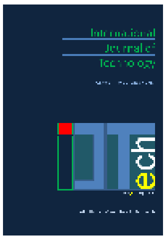

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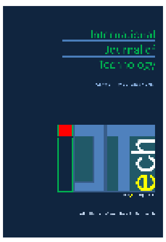

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TRADITIONAL CATAMARAN HULL FORM CONFIGURATIONS THAT REDUCE TOTAL RESISTANCE

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ABSTRACT

Catamaran resistance is very complex compared to monohull resistance, so it is particularly worthy of research. The below-water-level hull form influences the fluid flow characteristics around the ship, which either increases or decreases the total resistance. This study focuses on developing a new hull form by using the Lackenby Method to modify an existing hull form in such a way that reduces the total resistance. The total resistance was calculated using computational fluid dynamics, since the Navier-Stokes equation is built into the Tdyn software. The research results show that hull form changes can in fact decrease or increase the ship's total resistance. The best new hull form was chosen for its value of least total resistance.

Keywords: Catamaran; CFD; Hull Form; Lackenby Method; Resistance

1. INTRODUCTION

The catamaran is so famous and successful as a transportation mode not only because of its large dock area, but also because of the comfort and safety of its stability (Seif & Amini, 2004; Zouridakis, 2005).The success of research and development efforts in passenger catamarans inspired the present researchers to study the fishing vessel (Setyawan et al., 2010). The findings indicate that the catamaran's total resistance is lower than that of a monohull ship with the same displacement.

The catamaran's resistance problems have been discussed in the scientific forum, as its resistance component is more complex than that of a monohull ship. This is due to the complexity of the interaction effect and the interference of the catamaran's viscous and wave-making resistance components. Several studies on catamaran resistance have been conducted in the past, including earlier experiments by (Everest, 1968; Oving, 1985; Pien, 1976), as well as a theoretical study (Doctors, 1991).

Computational fluid dynamics (CFD) is a numeric solution for fluid dynamics (Bertram, 2000). In the case of ships, CFD help in expressing the fluid flow phenomenon around the hull, including the interference and interactive resistance components in the catamaran and multihull (Deng et al., 2010; Siqueira et al., 2007). The present study yielded results similar to (Utama, 1999) study, which applied CFD using the CFX^{TM} software to calculate the reducing viscous resistance component of the catamaran ship, with error differences below 5%.

Previous researchers have used Tdyn to calculate and predict ship resistance (Iqbal & Utama, 2014; Samuel et al., 2015; Yousefi et al., 2013), though the results of the present study differ

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A REVIEW OF BIOETHANOL PRODUCTION FROM PLANT-BASED WASTE BIOMASS BY YEAST FERMENTATION

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ABSTRACT

Commercialization of bioethanol has recently intensified due to its market stability, low cost, sustainability, alternative fuel energy composition, greener output and colossal fossil fuel depletion. Recently, because of greenhouse intensity worldwide, many researches are ongoing to reprocess the waste as well as turning down the environmental pollution. With this scenario, the invention of bioethanol was hailed as a great accomplishment to transform waste biomass to fuel energy and in turn reduce the massive usages of fossil fuels. In this study, our review enlightens various sources of plant-based waste feed stocks as the raw materials for bioethanol production because they do not adversely impact the human food chain. However, the cheapest and conventional fermentation method, yeast fermentation is also emphasized here notably for waste biomass-to-bioethanol conversion. Since the key fermenting agent, yeast is readily available in local and international markets, it is more cost-effective in comparison with other fermentation agents. Furthermore, yeast has genuine natural fermentation capability biologically and it produces zero chemical waste. This review also concerns a detailed overview of the biological conversion processes of lignocellulosic waste biomass-to-bioethanol, the diverse performance of different types of yeasts and yeast strains, plusbioreactor design, growth kinetics of yeast fermentation, environmental issues, integrated usages on modern engines and motor vehicles, as well as future process development planning with some novel co-products.

Keywords: Bioethanol; Conversion process; Lignocelluosic biomass; Plant-based waste biomass; Yeast fermentation

1. INTRODUCTION

In terms of organic chemistry, bioethanol (C_2H_5OH) or ethyl alcohol is an alcohol conformation that recently has emerged as a renewable bio-energy, biodegradable clear-colorless liquid, eco-friendly potential fuel to power automotive engines, as well as a potential petrol substitute for road transport vehicles (Hossain & Jalil, 2015b). Usually Bioethanol is synthesized from alcoholic fermentation of sucrose or simple sugars of diverse types of biomass, either from feedstock or non-feedstock sources (Gnansounou & Dauriat, 2005). Nowadays bioethanol production from cellulosic and lignocellulosic materials, especially wastes proffer an alternative solution to existing environmental, economic and energy problems being faced worldwide (Srivastava & Agrawal, 2014). Thus, a review of bioethanol production from plant-based waste biomass is currently needed to be researched extensively in order to decipher environmental and

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DUAL MATERIAL PILE GATE APPROACH FOR LOW LEAKAGE FINFET

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ABSTRACT

FinFET (Fin Field-Effect Transistor) technology has recently seen a major increase in adoption for use in integrated circuits because of its high immunity to short channel effects and its further ability to scale down. Previously, a major research contribution was made to reduce the leakage current in the conventional bulk devices. So many different alternatives like bulk isolation and oxide isolation are all having some pros and cons. Here in this paper, we present a novel pile gate FinFET structure to reduce the leakage current, as compared with Bulk FinFET without using any pstop implant or isolation oxide as in the Silicon-on-Insulator (SOI). The major advantage of this type of structure is that there is no need of high substrate doping, a 100% reduction in the random dopant fluctuation (RDF) and an increase in the I_{ON}/I_{OFF} value. It can be very useful to improve the drain-induced barrier lowering (DIBL) at smaller technological nodes. All the work is supported by 3D TCAD simulations, using Cogenda TCAD.

Keywords: Bulk FinFET; Charge accumulation; Leakage current; Lower doping; Pile Gate FinFET

1. INTRODUCTION

Previously, the double-gate MOSFET (Metal-Oxide-Semiconductor Field-Effect Transistor) was considered to be the most attractive device to succeed the planar CMOS (Complementary Metal-Oxide Semiconductor) transistor, (i.e., bulk mos (metal-oxide semiconductor) transistor), especially when the latter could not be scaled down any further. We need to find new ways to continue the scaling trend downwards. FinFET technology had been conceived as a result of the tremendous increase in the levels of integration (Colinge, 2007). The FinFET technology ensured a capacity to deliver superior levels of scalability needed to make sure that the current progress with increased levels of integration within integrated circuits could be maintained (Bin et al., 2002; Yoshida et al., 2005). The first successful concept of FinFET was proposed in 1999 (Huang et al., 1999) which was basically designed to reduce the short channel effects. Later, this structural design of FinFET offerred many advantages in terms of sub-threshold performance and also in IC processing. Only then, it was adopted as a major way forward for incorporation within IC technology (Moshgelani et al., 2012).

Over the years, there were several changes that FinFET had adopted, such as structures with underlap and overlap regions as reported in various researches (Pal et al., 2013; Pal et al., 2015), and those structures with different gate materials as reported in (Hussain et al., 2010), in relation to the Fin shape and so on. Gate-all-around (GAA) FinFET is one of the most recent developments in the FinFET series having the channel surrounded from all four sides (Singh et al.,

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