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Minimization of Fuel Utilization on Maritime Power Plants

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Abstract: In this study, a novel architectural model is to compute the fuel reduction and emission reduction based on energy storage device, an efficiency of engine and consumption of fuel oil. The main objective of this study is to reduce the fuel consumption of maritime power plants. Fuel oil utilization which is used for the numerical solution and optimized KKT method. In the proposed method is to reduce the computational time using linear interpolation. To increase the fuel savings and to reduce the emission by discharging and charging the ESD. In this optimization of fuel consumption method is used for marine applications.

Key words: Energy Storage Device (ESD), Karush Kuhn-Tucker (KKT), fuel consumption, power, plants, architectural model

INTRODUCTION

The power generators of maritime vessels depend on gas or diesel engine fuel consumption. The characteristics of engines are used to change the function of a quantity of power being generated by Nizetic *et al.* (2015). Efficiency is the main characteristics of an engine. Dynamically change the power demand it depends on the different power consumers. The consumers have a big authority on the line frequency and voltage on power bases, it is called as weak grid (Lindtjorn *et al*., 2014). To keep the frequency and voltage within a particular range, the generators are constantly adjusting the set points.

The novel method of ESD is used to reduce the fuel consumption. The device of ESD is used to stores the energy and also it is capable of distributing and consuming the power (Zhiwei *et al*., 2012). In the past few years, the technology of ESD has been introduced. The application of embedded and mobile are the main inspiration for the present grow of technology. The main focus of the automotive industry, the batteries and capacitors for improving the performance of a maritime system and also for reducing the fuel utilization and emission control (Guo *et al*., 2015). In the application of automotive industry, hybridization has been utilized.

In this study, the minimization of fuel consumption on maritime power plants has been proposed. The main motive of this study is to reduce the fuel consumption and also improve the efficiency of the architecture for marine applications (Rodatz *et al*., 2005).

Bactericidal potency based purification of the protein from marine edible oyster crassostrea madrasensis is approached. Marine associated fluorescent pseudomonads based biological control of sheath blight of rice is described by Jayaprakashvel *et al.* (2014). Minesite groundwater contamination mapping is presented by Buselli *et al.* (1998). Marine Associated Fluorescent pseudomonads based biological control of sheath blight of rice is discussed by Jayaprakashvel *et al.* (2014). Marine actinomycetes and their characterization based enzyme-mediated synthesis of silver nanoparticles are explained by Priya and Balasubramanian (2014).

PROPOSED ENERGY STORAGE DEVICE OF ELECTRICAL SYSTEM

The electrical vessel power plant consists of the diesel generator which is separated by bus tie breakers and switch breakers. The energy storage device can be connected to a power plant. The power supply could be passing either through alternating, current or direct current (Fig. 1). The hybrid power plant comprises of 2 diesel generator sets, 1 energy storage device, 2 thrusters and other loads. The line frequency of AC systems is in 50 or 60 Hz. By physically and electrically, the redundancy is utilized to enhance the overall safety.

Generator set: Engine and generator are the combination of a generator set. The generator set is used to converts fuel energy into power. The SFOC (Specific Fuel Oil Consumption) is known as the efficiency is provide by how much fuel is used to generate 1kW in 1h. Fuel oil consumption is measured, the consumption of fuel is in grams per hour (Fig. 1-3).

Energy storage device: The ESD concepts are used in this study for considering batteries and ultra-capacitors. The features of batteries are high energy density but a lower power density than ultra-capacitors. The three operational ESD functions in Fig. 3.

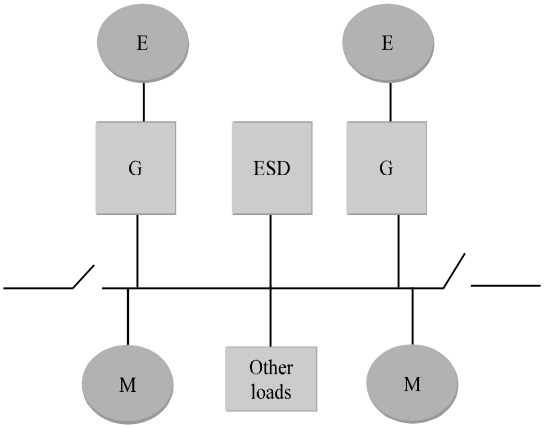

Fig. 1: Hybrid power plant

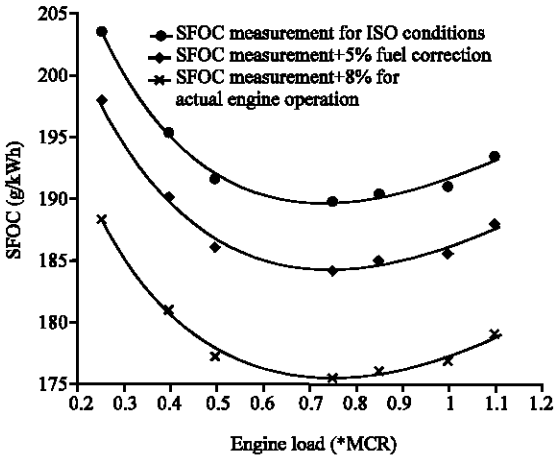

Fig. 2: SFOC Curve

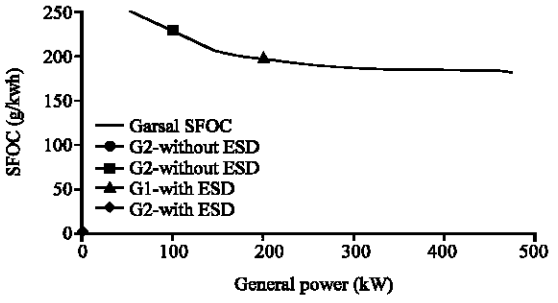

Fig. 3: Changes in the generator SFOC in the case of ESD connected or disconnected

- Peak shaving
- Spinning reserve
- Strategic loading

KKT METHOD OF FUEL OIL UTILIZATION

The polarization processes occurring at the electrode-electrolyte interfaces of Solid Oxide Fuel Cells (SOFC) were investigated by electrochemical impedance spectra measured at single cells under realistic operating conditions. The approach presented is based on distributions of relaxation times which are the basic quantity of interest in electrochemical impedance data analysis. A deconvolution method was developed and implemented that yields these characteristic distribution patterns directly from the impedance spectra. In contrast to nonlinear least squares curve fit of equivalent circuit models, no a priori circuit choice has to be made. Even more importantly, the excellent resolving capacity allows the untangling of the impedance contributions of up to three physically distinct processes within one frequency decade. With the method, processes with the highest polarization losses can be identified and targeted to improve cell performance. Based on the distributions, a general strategy for the identification of the reaction mechanisms is given. The evaluation of the distributions concerning peak parameters is illustrated by a physical model for oxygen reduction at the SOFC cathode-electrolyte interface. The method is expected to find many applications in electrochemistry beyond the field of solid oxide fuel cell development.

CONCLUSION

In this study, the minimization of the fuel utilization of maritime power plant has been proposed. In the ESD method is used to reduce the fuel consumption of maritime systems. In this ESD method the properties of the generator for every possible operation stipulation it is costly to acquire if not given by the producer. The fuel reduction and emission reduction both are used for maritime applications.

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