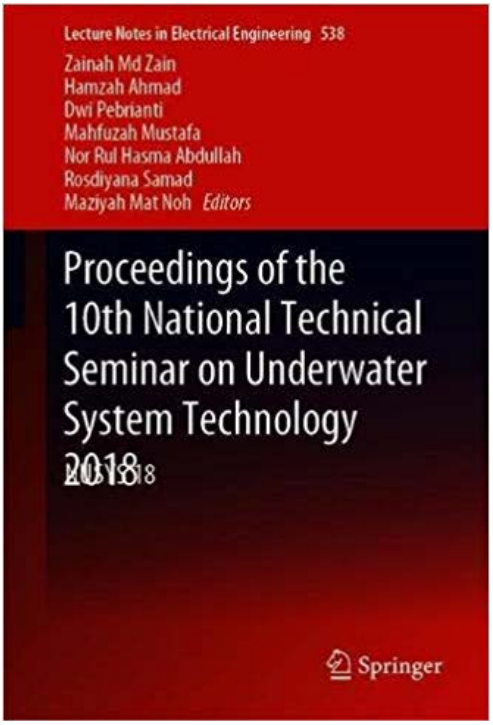

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Contents

SIMULTANEOUS PERTURBATION STOCHASTIC APPROXIMATION OPTIMIZATION FOR ENERGY MANAGEMENT STRATEGY OF HEV|

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Abstract. – *This paper addresses optimization for hybrid electric vehicle (HEV). This project is using a single agent method to optimize the power losses under a specific driving cycle which is simultaneous perturbation stochastic approximation (SPSA) based method. For optimization process, four gain are added in four main parts of the HEV system. Those main parts are engine, motor, generator and battery. These four gain is controlled the output for each components to give the minimum power losses. The design method is applied to free model of HEV by using Simulink/MATLAB software while M-File/MATLAB is used to apply the SPSA method. The result from design method achieved a minimum reduction of power losses compared to original system. Thus, the comparison of result has been done to show the different before and after optimization.*

Keywords: HEV, Simultaneous Perturbation Stochastic Approximation (SPSA), optimization

1. INTRODUCTION

Hybrid electric vehicles (HEV) is introduce to help user reduce their daily cost when using vehicle as fuel consumption can be minimize with help of electric system. This is because HEV is using hybrid of two sources which are Internal Combustion Engine (ICE) and an electric generator as alternate energy source. ICE consume fuel (petrol/diesel) to generate energy to move the vehicle while electric motor use electricity that generate by generator. HEV give a minimum fuel consumption as the electric motor used to move the vehicle from the rest and ICE support the vehicle when it start to accelerate. This fuel economic give an advantage to HEV compare to ICE vehicle. Energy Management Strategy (EMS) is a method to optimize the split usage between electric motor and fuel in order to give the best optimization of the fuel consumption. The main function of the EMS is power management. Automotive and communication control make a joint research that