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PROGRAMME ABSTRACT



“Bridging Gaps with Creativity for Future Sustainability”

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“Bridging the Gaps with Creativity for Future Sustainability”

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MODELLING OF LITHIUM ION BATTERY USING METHOD OF LINES TECHNIQUE

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Abstract

The modelling of Lithium ion battery involves a large and complex multiscale system measuring from the microscopic system (electrode particles) to that of the macroscopic system (the length of the cell). Furthermore, the time derivative of diffusion-advection model of charge transport is coupled with an ordinary differential equation (ODE) of potential equation. Therefore, solution to such model requires an efficient and a versatile method namely Method of lines technique (MOL). The MOL is a numerical technique that converts the PDEs into a set of ODEs in the time variable through discretisation process of spatial derivatives using finite difference scheme. The ODEs are then being solved using a built-in ODE solver. The potential discharge curve is compared to an experimental data of half-cell LiFePO₄ cathode. It is shown that the technique provides high accuracy solution to the system, numerical stability and computational efficiency.

UTILIZING RENEWABLE ENERGY THROUGH DEVELOPMENT OF GREEN ALTERNATIVE LUBRICANT

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Abstract

The development of bio-lubricant which is biodegradable, non-toxic and renewable resources are desired since the existing mineral based lubricant are of non renewable resources and prone to environmental issues. With increasing concerns of environmental issues, palm oil has been use to replaced mineral oil as lubricant. Zinc Dialkyl Dithiophosphate (ZDDP) and Molybdenum Dialkyl Dithiophosphate (MoDTP) was introduced into palm oil to improve the tribological properties in order to make it comparable with commercialized mineral based lubricant. Palm oil with the addition of ZDPP and MoDTP has shown superior tribological properties with reduction of coefficient of friction and wear scar diameter compared to SAE 15W-40 mineral based lubricant. Addition of ZDDP at 2wt% and MoDTP at 0.05wt% into palm oil is seen as the most desirable concentration as it surpass the lubrication properties of commercialized SAE 15W-40 mineral based oil.