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Effective Control of Speed and Regenerative Braking in Electric Vehicles Utilizing Fractional Order PI Controller

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Abstract

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Abstract:

In the automotive industry, a significant application of the Proportional Integral (PI) controller is in electric motors, specifically Brushless Direct Current (BLDC) motors used in Electric Vehicles (EVs). The accuracy of speed regulation in BLDC motors, acclaimed for their effectiveness and dependability, is crucial for enhancing vehicle performance and ensuring energy efficiency. On the other hand, regenerative braking is also important for energy recovery during vehicle navigation. In this paper, fractional order PI controller (FOPI) is implemented for smooth and precise control of speed and energy recovery during regenerative braking. Conventional Ziegler-Nichols method is used to tune the gains of the controller and for better controlling λ value for fractional order PI is predicted using trial

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