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Speed Control of the Asynchronous Motor Using Type-2 Fuzzy Logic

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Abstract **–** The objective of this study is to implement an intelligent control system based on Type-2 Fuzzy Logic for regulating the speed of an asynchronous motor. The initial phase of the project entailed the development of a mathematical model of the motor, with the objective of facilitating the implementation of conventional Type-1 Fuzzy Logic Control (FLC). Consequently, a refined Type-2 FLC strategy is proposed as an augmentation of the Type-1 system. The Type-2 membership functions, characterised by their three-dimensional structure, provide a robust framework for modelling uncertainties inherent in system parameters and rule bases. The present paper sets out the findings of a comparative simulation analysis of both Type-1 and Type-2 fuzzy control techniques applied to an asynchronous motor drive. The simulation results provide validation of the efficacy of the proposed Type-2 FLC approach, demonstrating superior performance in terms of disturbance rejection and dynamic response during speed reversals.

Keywords –Asynchronous Motor, Fuzzy Logic Control, Type-1 Fuzzy Logic, Type-2 Fuzzy Logic, Intelligent Control, Speed Regulation.