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Application of Iterative Feedback Tuning to the Control of an Asynchronous Motor

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Abstract **–**The present paper sets forth the implementation of an advanced control methodology, designated as Iterative Feedback Tuning (IFT), for the purpose of enhancing the performance of an asynchronous (induction) motor. IFT is a data-driven technique that allows controller parameters to be tuned directly from closed-loop experiments, thus obviating the necessity for a mathematical model of the system. This renders it especially useful for systems where modelling is difficult, time-consuming, or prone to inaccuracies.

The proposed approach involves the real-time collection of system response data during operational processes. Subsequently, this data is utilised to facilitate the refinement of controller parameters through the implementation of a gradient-based algorithm. The objective is to minimise a cost function that represents the discrepancy between the desired and actual motor performance. By repeating this process iteratively, the controller gradually improves and adapts to the system's dynamics.

The method was applied to an asynchronous motor, which is widely used in industrial applications due to its robustness and simplicity. The findings indicate that IFT can enhance the motor's speed and torque response under diverse operating conditions, obviating the necessity for prior knowledge of the motor's internal model.

The present study corroborates the practicality and efficiency of Iterative Feedback Tuning for real-time control systems, particularly in electrical drives.

Keywords – Iterative Feedback Tuning, controller, optimal parameters, gradient algorithm, asynchronous motor.