

# Application of Proportional Observer With Integrators to Estimation of Induction Motor Magnetic Fluxes

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## Abstract

Induction motor control systems (i.e. vector control, multiscalar control) use magnetic fluxes of the motor as a feedback signals. Magnetic fluxes of the motor are difficult to measure and have to be reconstructed with use of the observers. Application of the observer with integrators is discussed, taking into consideration observer's stability and calculation of its gains. In addition, considered observer is equipped with adaptation mechanism for rotational speed estimation. Observer's structure dependent on specific properties of the induction motor is presented. Mathematical model of the observer is presented, described with differential state equations. It is proven that there exists a class of observed systems for which discussed observer is always unstable, independently of its gains selection. Stability conditions are presented as well. The problem of stability is solved by replacing additional integrators with modified ones. It is shown that proper selection of parameters of modified integrators and observer's gains provides its stability for every observed system. Gains of the observer are optimized with use of genetic algorithm. Optimization criteria are discussed, as well as resulting fitness function. Results of simulations and laboratory investigations are presented as well.

## References

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