

Scalar control on speed drive for ac motor

Abstract

This paper aims to investigate the performance of ABB ACS800 variable speed drive operating under Scalar Control mode, and eventually develop a set of experimental procedures for undergraduate laboratory purposes. Scalar Control is the most widespread form of ac drive, for its low cost and simplicity especially implemented in the open loop mode. Scalar control is achieved by controlling the stator voltage and frequency, thus maintaining the motor's air-gap flux at a constant value. To illustrate the control method, the ac drive is configured according to the wiring diagram in the firmware manual that the drive control location can be both local and external. The drive is selected to operate under Factory application macro, whereby either ordinary speed control applications or constant speeds applications may be used. Under ordinary speed control, frequency reference signals are provided to the drive through the analogue input AI1. The drive will operate at the given frequency reference value throughout the operation regardless of any changes in the load. The torque speed curve moves along the speed axis with no changes to the shape as the supply frequencies changes. On the other hand, the drive allows three preset constant speed through digital inputs DI5 and DI6. The drive operate at a constant speed value over a time period, and only switch from one constant speed to another constant speed by triggering the two input switches. Scalar control is most suitable for applications not required high precision, such as blowers, fans and pumps