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[54] REGULATION SYSTEM FOR DECOUPLED EFFICIENCY OPTIMIZED OPERATION OF DC TRACTION MOTORS

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[57] ABSTRACT

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A regulation system for controlling a dc motor having a separately excited armature and field includes microprocessor based pulse width (duty cycle) and frequency modulation control of an armature amplifier and a field amplifier. Motor operating efficiency is optimized through microprocessor control of the field amplifier as a function of actual armature current, actual field current and desired armature speed. Sensed armature current is multiplied by a fixed optimal field constant to generate an optimal field current control signal. The optimal field current control signal is summed with a signal representative of field current required for desired armature speed less a signal representative of actual field current to generate a field current error signal. A controller receives the field current error signal and generates a pulse width modulated field current control effort signal which is applied to the field amplifier. An armature voltage controller receives an input signal which is the difference between desired armature speed and actual armature speed. The input signal is generated only when actual field current exceeds a predetermined field saturation current value. The controller generates a pulse width modulated armature control effort signal which is applied to the armature amplifier only if actual armature current is below the maximum allowable armature current.

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Related U.S. Application Data

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[52] U.S. Cl. 318/493; 388/801
[58] Field of Search 318/766, 539, 318/139, 493; 388/800-808, 907.5, 910

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15 Claims, 3 Drawing Sheets

