

ABSTRACT

A control system according to an embodiment controls a synchronous motor including a magnet inside a rotor. The control system includes an inverter that outputs an alternating current for driving the synchronous motor; a gate command generating unit that generates a gate command for driving the inverter; a current detecting unit that detects a current value of the alternating current output from the inverter; a magnetic-pole position estimating unit that estimates a magnetic-pole position based on the current value detected by the current detecting unit; a control unit that instructs, upon determination of magnetic-pole polarity, the gate command generating unit to generate a gate command for polarity determination so that the d-axis component of the current value detected by the current detecting unit represents a predetermined value; and a magnetic-pole polarity determining unit that obtains, if the gate command for polarity determination is generated and based on the magnetic-pole position estimated by the magnetic-pole position estimating unit, first information indicating an inductance occurring due to a positive d-axis current and second information indicating an inductance occurring due to a negative d-axis current, compares the first information and the second information, and determines one of the first information and the second information of a greater value to be the north pole. When a current is applied in the positive direction and the negative direction with an identical predetermined current value, the control system determines, as the north pole side, the side on which the inductance of the magnetic-pole direction increases.