WHAT IS CLAIMED IS:

1. A control method for an electric drive system of a vehicle, the electric drive system comprising an electric motor and an electric motor controller, the method comprising:

acquiring a shaft torque of the electric motor and a present operating point of the vehicle in response to a vehicle heating demand signal;

acquiring a present heat generation power of the electric drive system according to the present operating point of the vehicle;

determining a current adjustment amplitude according to a required heating power of the vehicle and the present heat generation power;

acquiring a three-phase current value and a position value of the electric motor, and acquiring a present direct axis current value and a present quadrature axis current value of the electric motor at the present operating point of the vehicle according to the three-phase current value and the position value;

controlling the present direct axis current value to oscillate at a preset change frequency and the current adjustment amplitude as a target direct axis current value;

acquiring a target quadrature axis current value according to the target direct axis current value and the shaft torque of the electric motor;

acquiring an electric motor drive signal according to the target direct axis current value, the target quadrature axis current value, the present direct axis current value, and the present quadrature axis current value; and

sending the electric motor drive signal to the electric motor controller, to control operation of the electric motor,

wherein the electric motor controller comprises a power switching device; and when the target

direct axis current value is greater than a limit value, a carrier frequency of the power switching device fluctuates randomly in a preset range.

2. The control method for an electric drive system of a vehicle according to claim 1, wherein the step of controlling the present direct axis current value to oscillate at a preset change frequency and the current adjustment amplitude as a target direct axis current value comprises:

acquiring a first direct axis current value and a second direct axis current value according to the current adjustment amplitude, the target direct axis current value changing periodically at the preset change frequency with the present direct axis current value as a reference value, the first direct axis current value as a peak, and the second direct axis current value as a valley, wherein the first direct axis current value is a sum of the present direct axis current value and the current adjustment amplitude, and the second direct axis current value is a difference between the present direct axis current value and the current adjustment amplitude.

3. The control method for an electric drive system of a vehicle according to claim 1 or 2, wherein the step of determining a current adjustment amplitude according to a required heating power of the vehicle and the present heat generation power comprises:

calculating a power difference between the required heating power of the vehicle and the present heat generation power; and

acquiring the current adjustment amplitude according to the power difference, wherein the current adjustment amplitude increases with the power difference.

4. The control method for an electric drive system of a vehicle according to any one of claims 1

to 3, wherein the target direct axis current value and the target quadrature axis current value meet:

$T_e = 1.5N_P\left[\left(L_d - L_q\right)i_d + \varphi_f\right]i_q$;

where T_e is the shaft torque of the electric motor, N_P is a number of pole pairs in a rotor of the electric motor, L_d is a direct axis inductance, L_q is a quadrature axis inductance, i_d is the target direct axis current value, φ_f is a magnetic flux linkage, and $i_q$is the target quadrature axis current value.

5. The control method for an electric drive system of a vehicle according to any one of claims 1 to 4, further comprising:

determining that the required heating power of the vehicle changes; and

adjusting the current adjustment amplitude or the preset change frequency according to the changed required heating power of the vehicle.

6. The control method for an electric drive system of a vehicle according to any one of claims 1 to 5, wherein the step of acquiring a present direct axis current value and a present quadrature axis current value of the electric motor at the present operating point of the vehicle according to the three-phase current value and the position value comprises the steps of:

transforming the three-phase current value into a two-phase static current value by Clark transformation; and

transforming the two-phase static current value into a two-phase rotatory current value by Park transformation, wherein the two-phase rotatory current value comprises the present quadrature axis current value and the present direct axis current value.

7. The control method for an electric drive system of a vehicle according to any one of claims 1 to 6, wherein the step of acquiring an electric motor drive signal according to the target direct axis current value, the target quadrature axis current value, the present direct axis current value, and the present quadrature axis current value comprises:

calculating a difference between the target direct axis current value and the present direct axis current value to acquire a direct axis current difference, and calculating a difference between the target quadrature axis current value and the present quadrature axis current value to acquire a quadrature axis current difference;

performing closed loop current adjustment according to the direct axis current difference and the quadrature axis current difference, to obtain a direct axis voltage value and a quadrature axis voltage value;

transforming the direct axis voltage value and the quadrature axis voltage value into a two-phase static voltage value by TPark transformation;

acquiring a bus voltage value of the electric drive system; and

performing pulse width modulation according to the bus voltage value and the two-phase static voltage value to obtain the electric motor drive signal.

8. An electric drive system, comprising:

an electric motor and an electric motor controller;

a current sensor, configured to collect a three-phase current value of the electric motor;

a position sensor, configured to collect a position value of the electric motor; and

a processor, connected to the electric motor controller, the current sensor and the position sensor, and configured to implement the control method for an electric drive system of a vehicle

according to any one of claims 1 to 7.

9. A vehicle, comprising:

a heating demand system and a vehicle controller, wherein the vehicle controller is configured to send a vehicle heating demand signal when the heating demand system is determined to have a heating demand; and

the electric drive system according to claim 8, connected to the vehicle controller, and forming a heat conducting loop with the heating demand system.

10. The vehicle according to claim 9, wherein the heating demand system comprises a power battery.

11. The vehicle according to claim 9 or 10, wherein the heating demand system comprises a vehicle occupant compartment and an air conditioning system.