CLAIMS

1. Anticipatory control system for electric motor applied to cyclical loads, the control system comprising:

- an electric motor (10);
- at least an electronic control unit (20);
- at least an electronic power unit (30);
- the electric motor (10) being electrically driven by the electronic power unit (30);
- an electronic power unit (30) being electrically commanded by way of the electronic control unit (20),

the system being **characterized by** comprising an average speed controller and an electric position-observing device of the electric motor, both implemented by way of the electronic control unit (20), the average speed controller being arranged to monitor an average speed of the electric motor (10), the position-observing device being arranged to monitor and store an instantaneous speed (V_i) in each position of the electric motor (10) and estimate, by way of each position, an instantaneous speed of control (V_c) of the electric motor (10), the electronic control unit (20) being arranged to calculate an average voltage (V_m) based on the average speed monitored, the electronic power unit (30) being arranged to electrically drive the electric motor (10) by way of a control voltage value ($V_{control}$), this control voltage value being ($V_{control}$) calculated by multiplying the average voltage (V_m) by the result of the division between the instantaneous speed of control (Vc) and the average speed.

2. System according to claim 1, characterized wherein the electric motor (10) is of the Brushless DC type.

3. System according to claim 1, characterized wherein the electronic power unit (30) comprises a set of electronic power switches (SW2N) arranged to control a voltage in each phase of the electric motor (10).

4. System according to claim 1, characterized wherein the control voltage value ($V_{control}$) is calculated so as to provide a waveform of the current

of the electric motor (10) substantially aligned to a waveform of the induced voltage in the electric motor (10).

5. System according to claim 1, characterized wherein the instantaneous speed (V_i) is a sample of the prior round of the electric motor (10) such that the system anticipates a behavior of the cyclical loads.

6. System according to claim 1, characterized wherein the position-observing device operates so as to arrange a speed observer.

7. System according to claim 6, characterized wherein the speed observer is a timer arranged to monitor a response from the position sensor.

8. System according to claim 6, characterized by being arranged to apply a constant voltage to the electric motor (10) during each of the commutation positions.

9. System according to claim 8, characterized wherein the voltage applied in each position of the electric motor (10) is given based on the rotations measured in each position.

10. System according to claim 1, characterized by using a filter arranged to optimize the reading of the speed of the electric motor (10).

11. Anticipatory control method for electric motor (10) applied to cyclical loads, the method being characterized by comprising the following steps:

i) calculate an average speed of the electric motor (10);

ii) calculate, using the average speed of the prior step, an average voltage (V_m),

iii) monitor an instantaneous speed (V_i) in each position of the electric motor (10),

iv) store one or more instantaneous speed (Vi) values calculated in the prior step,

v) estimate, by way of each position of the electric motor (10), an instantaneous speed of control (V_c) of the electric motor (10),

vi) electrically drive the electric motor (10), by way of a control voltage value ($V_{control}$), this control voltage value being ($V_{control}$) calculated by multiplying the average voltage (V_m) by the result of the division between the

instantaneous speed of control (V_c) and the average speed.

12. Anticipatory control method for electric motor (10) according to claim 11, characterized wherein the steps are implemented by way of the control system defined in claims 1 to 10.

CLAIMS

1. Anticipatory control system for electric motor applied to cyclical loads, the control system comprising:

- an electric motor (10);
- at least an electronic control unit (20);
- at least an electronic power unit (30);
- the electric motor (10) being electrically driven by the electronic power unit (30);
- an electronic power unit (30) being electrically commanded by way of the electronic control unit (20),

the anticipatory control system further comprising an average speed controller and an electric position-observing device of the electric motor, both implemented by way of the electronic control unit (20), the average speed controller being arranged to monitor an average speed of the electric motor (10), the position-observing device being arranged to monitor and store an instantaneous speed (V_i) in each position of the electric motor (10) and estimate, by way of each position, an instantaneous speed of control (V_c) of the electric motor (10), the electronic control unit (20) being arranged to calculate an average voltage (V_m) based on the average speed monitored, the electronic power unit (30) being arranged to electrically drive the electric motor (10) by way of a control voltage value ($V_{control}$), this control voltage value ($V_{control}$) being calculated by multiplying the average voltage (V_m) by the result of the division between the instantaneous speed of control (V_c) and the average speed.

2. System according to claim 1, wherein the electric motor (10) is of the Brushless DC type.

3. System according to claim 1, wherein the electronic power unit (30) comprises a set of electronic power switches (SW2N) arranged to control a voltage in each phase of the electric motor (10).

4. System according to claim 1, wherein the control voltage value ($V_{control}$) is calculated so as to provide a waveform of the current of the electric motor (10) substantially aligned to a waveform of the induced voltage in the electric motor (10).

5. System according to claim 1, wherein the instantaneous speed (V_i) comprises a sample of the prior round of the electric motor (10) such that the system anticipates a behavior of the cyclical loads.

6. System according to claim 1, wherein the position-observing device operates so as to arrange a speed observer.

7. System according to claim 6, wherein the speed observer comprises a timer arranged to monitor a response from the position sensor.

8. System according to claim 6, wherein said system is arranged to apply a constant voltage to the electric motor (10) during each of the commutation positions.

9. System according to claim 8, wherein the voltage applied in each position of the electric motor (10) is given based on the rotations measured in each position.

10. System according to claim 1, further comprising a filter arranged to optimize the reading of the speed of the electric motor (10).

11. Anticipatory control method for electric motor (10) applied to cyclical loads, the method comprising the following steps:

i) calculating an average speed of the electric motor (10);

ii) calculating, using the average speed, an average voltage (V_m),

iii) monitoring an instantaneous speed (V_i) in each position of the electric motor (10),

iv) storing one or more instantaneous speed (V_i) values calculated in the prior step,

v) estimating, by way of each position of the electric motor (10), an instantaneous speed of control (V_e) of the electric motor (10),

vi) electrically driving the electric motor (10), by way of a control voltage value ($V_{control}$), this control voltage value being ($V_{control}$) calculated by a method comprising multiplying the average voltage (V_m) by the result of the division between the instantaneous speed of control (V_c) and the average speed.

12. Anticipatory control method for electric motor (10) according to claim 11, wherein the steps are implemented by way of a control system defined comprising:

— an electric motor (10);

— at least an electronic control unit (20);

— at least an electronic power unit (30);

— the electric motor (10) being electrically driven by the electronic power unit (30);

— an electronic power unit (30) being electrically commanded by way of the electronic control unit (20),

the anticipatory control system further comprising an average speed controller and an electric position-observing device of the electric motor, both implemented by way of the electronic control unit (20), the average speed controller being arranged to monitor an average speed of the electric motor (10), the position-observing device being arranged to monitor and store an instantaneous speed (V_i) in each position of the electric motor (10) and estimate, by way of each position, an instantaneous speed of control (V_c) of the electric motor (10), the electronic control unit (20) being arranged to calculate an average voltage (V_m) based on the average speed monitored, the electronic power unit (30) being arranged to electrically drive the electric motor (10) by way of a control voltage value ($V_{control}$), this control voltage value ($V_{control}$) being calculated by multiplying the average voltage (V_m) by the result of the division between the instantaneous speed of control (V_c) and the average speed.