CLAIMS

1. A digitally controlled motor device with storage, comprising:

a stator;

a flywheel having an axis of rotation and being rotatably mountable on a shaft of a rotating machine and having at least a first set of magnetic coils arranged thereon;

an induction rotor having an axis of rotation and being mountable on the shaft in magnetic communication with the first set of magnetic coils of the flywheel such that a change in magnetic flux at the first set of magnetic coils induces a current in the induction rotor;

at least one set of second magnetic coils arranged on the stator in magnetic communication with the induction rotor; and

a first controller for controlling a supply of electrical power from the flywheel to the second set of magnetic coils to force acceleration or deceleration of the induction rotor; whereby the induction rotor is adapted to receive electrical power from the flywheel via the first set of magnetic coils and from the second set of magnetic coils.

2. The digitally controlled motor device with storage of claim 1, wherein the shaft is a drive shaft, such as a drive shaft of a vehicle or a drive shaft adapted for driving a compressor.

3. The digitally controlled motor device with storage of claim 1 or claim 2, wherein the magnetic flux and associated electrical power experienced by said second set of magnetic coils is at an angular velocity ω_{RF} that is equal to the velocity of the induction rotor ω_R relative to the angular velocity of the flywheel ω_F and governed by the equation:

$$\omega_{RF} = \omega_R - \omega_F$$

4. The digitally controlled motor device with storage of any one of claims 1 to 3, wherein a third set of magnetic coils is arranged on the flywheel and in electrical communication with the first controller for the transfer of electrical power to and from the flywheel, wherein the number of coils in the first set of magnetic coils preferably differs from the number of coils in the third set of magnetic coils so as to produce a geared ratio of the coils installed on the flywheel.

5. The digitally controlled motor device with storage of any one of claims 1 to 4, further including an external electrical power storage device, such as a battery or a super capacitor, the first controller adapted to supply electrical power from the external electrical power storage device to the flywheel or to transfer electrical power stored in the flywheel to the external electrical power storage device, the first controller being adapted to control the speed of rotation of the flywheel by controlling an amount of power supplied to the third set of magnetic coils.

6. The digitally controlled motor device with storage of any one of claims 1 to 5, further including a second controller adapted to supply electrical power to the induction rotor via the second set of magnetic coils, wherein each of the first controller and the second controller is preferably a digitally controlled switched brushless motor controller, and wherein the first controller and the second controller each preferably include an induction rotor position sensor and an induction rotor speed sensor.

7. The digitally controlled motor device with storage of claim 6, wherein the first and second controllers include at least one rotary encoder and/or magnetic hall sensor; and/or wherein the first controller and the second controller are in electrical communication with each other.

8. The digitally controlled motor device with storage of claim 4, further including a fourth set of magnetic coils connected to the stator in electrical communication with the external electrical power storage device for transfer of electrical power to or from the flywheel via the third set of magnetic coils, wherein the first, second, third and fourth sets of magnetic coils and the induction rotor are preferably arranged in a radial flux configuration.

9. The digitally controlled motor device with storage of any one of claims 1 to 8, further including at least one bearing connected to the stator for supporting the shaft and/or the flywheel in controlled rotation about its axis of rotation.

10. The digitally controlled motor device with storage of any one of claims 1 to 9, wherein the magnetic coils are induction coils or wherein the magnetic coils are permanent magnets.

11. The digitally controlled motor device with storage of any one of claims 1 to 10, wherein the stator includes an enclosure around the device components, the enclosure sealing the induction rotor, the flywheel and the shaft therein, wherein a magnetic coupling is preferably used to transmit power from inside the enclosure to an external shaft.

12. The digitally controlled motor device with storage of claim 11, wherein the apparatus further includes: a non-return valve and a vacuum pump adapted for placing the enclosure and stator under a full or partial vacuum, and/or a water jacket arranged outside the stator and enclosure.

13. The digitally controlled motor device with storage of any one of claims 1 to 12, wherein the induction rotor is operatively associated with a plurality of turbine rotor blades for rotational movement therewith as the turbine blades are rotated by fluid movement.

14. The digitally controlled motor device with storage of any one of claims 1 to 13, wherein the induction rotor has a flywheel side in electrical communication with the first set of magnetic coils and a stator side in electrical communication with the second set of magnetic coils.

15. The digitally controlled motor device with storage of any one of claims 1 to 14, further including a first section that includes a first enclosure and the flywheel and a separate second section that includes a second enclosure and the induction rotor, and preferably further including a connection circuit board arranged in electrical communication with each of the flywheel and the induction rotor.

16. The digitally controlled motor device with storage of claim 15, wherein the first section includes a fifth set of magnetic coils mounted on the enclosure in magnetic communication with the first set of magnetic coils of the flywheel, and wherein the second section includes a sixth set of magnetic coils mounted on the second enclosure in magnetic communication with the induction rotor, the connection circuit board being adapted to transmit electrical power from the fifth set of magnetic coils to the induction rotor via the sixth set of magnetic coils.

17. The digitally controlled motor device with storage of any one of claims 1 to 16, further including a connection circuit board located inside the induction rotor, the connection circuit board being adapted to transmit electrical power between the flywheel first set of magnetic coils and the induction rotor via the second set of magnetic coils, the connection circuit board inside the induction rotor preferably being controlled wirelessly via either of the first controller or the second controller located outside of the stator.

18. The digitally controlled motor device with storage of any one of claims 15 to 17, wherein the connection circuit board includes a programmable logic controller adapted for conditioning of electrical power transmitted between the flywheel and the induction rotor, wherein the programmable logic controller is preferably adapted to control a plurality of electrical and/or mechanical switches to obtain a change in frequency and voltage of electrical power transmitted through the induction rotor.

19. The digitally controlled motor device with storage of claim 18, wherein the programmable logic controller is adapted to control a plurality of variable capacitors for obtaining a change in the voltage, current level and frequency at the induction rotor such that the current leads the voltage to cause a magnetic flux in the induction rotor of variable frequency and magnitude.

20. The digitally controlled motor device with storage of claim 18 or claim 19, wherein the programmable logic controller has a plurality of variable inductors, variable resistors and variable capacitors and is adapted to control the current, voltage level and frequency of the plurality of variable inductors, resistors and capacitors such that the current leads or lags the voltage at the induction rotor such that the current creates a magnetic flux in the induction rotor of variable frequency and magnitude.