Brushless Direct-Current Motor with Stationary Armature and Field

An improved electronically commutated dc motor has an active fixed field winding, an active fixed armature winding, and a passive rotor. By using the well-known brushless-dc-motor switching technique, the motor provides a continuous controllable and reversible torque without the use of sliding contacts. Because no power is dissipated in the rotating assembly, bearing life is prolonged and thermal limitations are reduced.

The rotor, made of a material with high magnetic permeability, has a number of salient poles or teeth and is rotatably mounted near the field winding so that the winding electromagnetically induces magnetic flux in the poles. The armature windings are also mounted near the rotor. In operation, the magnetic flux induced in the poles interacts with the current passing through the armature windings. This current flow is controlled by a solid-state commutator (Fig. 2) as in a brushless dc motor. The magnitude of the current supplied to the field windings controls the motor's speed. The windings can be connected in a series, shunt, or compound configuration as desired.

Wear-prone elements are eliminated, and mechanical (continued overleaf)
and magnetic losses in the rotating structure are reduced. The motor's inertia is reduced, its response time is improved, and its dynamic braking and acceleration torques may be controlled. The new motor is electrically, magnetically, and mechanically inexpensive and uncomplicated. The fact that the field flux can be connected in various configurations makes the invention flexible.

Note:
Requests for further information may be directed to:
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Patent status:
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