the rotating shaft **23**. Such a disk may be mounted along the shaft for example through an intermediary sleeve **39**.

[**0034**] In brake configuration **11**, the magnetic flux **37** generated is substantially perpendicular to surface **42** of the rotor **21**, which in this embodiment is shown as a disk, and the magnetic flux is substantially parallel to the shaft **23** as the flux passes through the field controllable material.

[**0035**] In the first embodiment of the invention illustrated in **FIG. 1**, the disk or rotor **21** is supported by shaft **23** at one shaft end. By supporting the rotor **21** in this manner, a significant portion of the length of the shaft is available to effectively support other components and systems of brake **11**. The bearings **35** are located along the shaft length and are spaced apart by an axial distance required to provide rotor stability. As a result of such bearing location and alignment and location, a chamber **17** is defined by the housing **13**, bearings **35** and pole pieces **33** wherein various sensors, electronics and other systems may be housed. As a result, brake **11** represents a compact, integrated package generally comprising the required mechanical rotor **21** and shaft **23**, field responsive material **41**, field generator **29** and monitor and control electronics/sensors **25**.

[**0036**] By locating the magnetic field generator **29** along one side of the rotor **21**, additional combinations of rotor **21** and field generator **29** may be stacked against the rotor **21** shown in **FIG. 1**. Any number of additional rotors and field generators may be provided in order to provide the appropriate duplication of magnetic field generators **29** thereby resulting in a brake configuration with multiple disks, suitable for a desired application. Such a brake configuration having a plurality of disks and generators is not illustrated in **FIG. 1**. Such an alternate configuration would duplicate the **FIG. 1** arrangement of rotor **21** and generator **29** in multiple iterations in the direction of end plate **19**. Another advantage of first embodiment brake **11** is that by providing a plurality of rotors, the integrated package may be made smaller in the radial disk direction and thus may be more suitable for specific applications where smaller brake configurations are required.

[**0037**] **FIG. 2** illustrates a second embodiment of the present invention. The second embodiment magnetic brake **51** is comprised of many of the elements comprising brake **11** of **FIG. 1**. In this alternate embodiment, brake **51** comprises housing **53** which defines chamber **55** for housing integrated electronics/sensors **59** and also defines chamber **57** for housing rotor **71**. Similar to the embodiment shown in **FIG. 1**, an end plate **19** is provided to close and seal the chamber **57**. Although the plate is shown as substantially planar, the plate may also comprise portions that extend substantially perpendicular to the plate and wrap around the housing. Ball bearings **67** serve to support the shaft **69** and conventional seal **87** closes off the first chamber **57** to prevent the field responsive material **85** from migrating from within the chamber **57** toward the bearings **67** and out of the chamber **57**. In this alternate embodiment, the rotor **71** is attached to an end of shaft **69** is engaged to the rotor **71** and is rotatable with the shaft. The rotor is not limited to a disk-shaped configuration as will become more readily apparent from the discussion that follows with reference to **FIGS. 3 and 5**.

[**0038**] As in the case with **FIG. 1, a** sleeve **65** can be mounted on the shaft **69** and the monitoring and controlling electronics/sensor **59** are shown schematically in greater detail as made up, for example, of two parts **61** and **63**. A first part **61** may be fixed within the housing and not fixedly engaged to the sleeve **65**. The first part **61** can include monitor and control electronics as well as sensors and/or detectors. Portion **63** can be, for example, a rotating disk **52** mounted on the sleeve **65**, the rotation of which is detected by sensors mounted on the fixed part **61**. Thus, the rotation of the shaft **69** and rotor **71** can be detected to allow appropriate control of electromagnetic field generator **73**.

[**0039**] In the second embodiment brake **51**, the electromagnetic field generator **73** may include an electromagnetic coil **75** and a pole piece configuration that is slightly different than the configuration of **FIG. 1**. Turning to **FIG. 2**, the pole configuration includes a first radially extending pole portion **77** and a second axially extending pole portion **79**. The second pole portion extends axially between radially extending pole portion **77** and plate **19**. Respective gaps **74** and **76** separate the outer periphery of the rotor **71** and the second pole portion **79** and the working surface **42** and the first pole portion **77**. When a current is supplied to the coil **75**, the field generator is activated and thereby generates magnetic flux **81**, represented dashed in **FIG. 2**, which acts on field responsive material that fills the chamber **57** and gaps **74** and **76**. The field **81** changes the rheology of the material causing the material to act upon the rotor outer periphery and surface **42** and thereby provide resistance to the motion of the rotor **71**. Like brake **11** of **FIG. 1**, although a single rotor **71**/generator **73** combination is shown in **FIG. 2**, brake **51** may comprise any suitable number of rotor/generator combinations required to supply the requisite braking forces. The benefits associated with the first embodiment brake recited hereinabove are also realized with the second embodiment brake **51**.

[**0040**] A third embodiment brake of the present invention is illustrated in **FIG. 3** and is referred to generally at **101**. Brake **101** comprises hollow, cylindrical housing **103** which defines a first chamber **113** for housing a rotor **107** for rotation therein about axis **99** and defines second chamber **111** which houses monitoring and/or controlling electronics **115** in the manner previously described. The first chamber also houses a volume of a field responsive material **135**. The rotor is a drum-shaped rotor that comprises a substantially I-shaped cross section with a wide outer annular peripheral portion **108** joined by a narrow web **112**. The rotor **107** is fixed in a conventional manner to one end of shaft **105** which in turn is supported by bearings **133** along the shaft length and generally in the manner previously described with first and second embodiment brakes **11** and **51**. Closing plate **109** serves to seal and close one end of the housing **103**. Plate **114** closes and seals the opposite housing end. The rotor may have any suitable cross section and other suitable configurations may comprise a C-shaped cross section and an L-shaped cross section for example.

[**0041**] The monitor and/or control electronics **115**, in exemplary form, can include a combination of rotating disks having appropriate notches or other detectable indicia thereon. The rotating disks **117** may be mounted on a sleeve **118** fixed to shaft **105**. Other components **119** of the electronics **115** can be fixed within the chamber **111** in a manner so that the components surround the sleeve and are not in contact with the sleeve **118**. In this way, the components **119** do not rotate with the sleeve **118**. Sensors or brushes