ENCAPSULATING MAGNETIC FIELDS FOR PLASMA CONFINEMENT

TECHNICAL FIELD

[1] This disclosure generally relates to fusion reactors and more specifically to encapsulating magnetic fields for plasma confinement.

BACKGROUND

[2] Fusion power is power that is generated by a nuclear fusion process in which two or more atomic nuclei collide at very high speed and join to form a new type of atomic nucleus. A fusion reactor is a device that produces fusion power by confining and controlling plasma. Typical fusion reactors are large, complex, and cannot be mounted on a vehicle.

SUMMARY OF PARTICULAR EMBODIMENTS

[2a] According to a first aspect of the present invention, there is provided a fusion reactor comprising:

an enclosure comprising a centerline running down a center axis of the enclosure;

an open-field magnetic system comprising one or more internal magnetic coils suspended within the enclosure and centered on the centerline; and

a plurality of encapsulating magnetic coils centered on the centerline, the plurality of encapsulating magnetic coils having a larger diameter than the one or more internal magnetic coils of the open-field magnetic system, the plurality of encapsulating magnetic coils operable to form a magnetosphere around the open-field magnetic system;

wherein the open-field magnetic system and the plurality of encapsulating magnetic coils are operable, when supplied

with electrical currents, to form magnetic fields for confining plasma within the enclosure.

[2b] According to a second aspect of the present invention, there is provided a fusion reactor comprising:

an enclosure;

an open-field magnetic system comprising one or more internal magnetic coils suspended within the enclosure; and

one or more encapsulating magnetic coils coaxial with the one or more internal magnetic coils of the open-field magnetic system, the one or more encapsulating magnetic coils operable to form a magnetosphere around the open-field magnetic system;

wherein the open-field magnetic system and the one or more encapsulating magnetic coils are operable, when supplied with electrical currents, to form magnetic fields for confining plasma within the enclosure.

[2c] According to a third aspect of the present invention, there is provided a fusion reactor comprising:

an open-field magnetic system comprising one or more internal magnetic coils suspended within an enclosure; and

one or more encapsulating magnetic coils coaxial with the one or more internal magnetic coils of the open-field magnetic system, the one or more encapsulating magnetic coils operable to form a magnetosphere around the open-field magnetic system;

wherein the open-field magnetic system and the one or more encapsulating magnetic coils are operable, when supplied with electrical currents, to form magnetic fields for confining plasma within the enclosure.

[3] According to one embodiment, a fusion reactor includes an enclosure, an open-field magnetic system comprising one or more internal magnetic coils suspended within the enclosure, and one or more encapsulating magnetic coils coaxial with the one or more internal magnetic coils of the open-field magnetic system. The one or more encapsulating magnetic coils form a magnetosphere around the open-field magnetic system. The open-field magnetic system and the one or more encapsulating magnetic coils, when supplied with electrical currents, form magnetic fields for confining plasma within the enclosure.

[4] Technical advantages of certain embodiments may include providing a compact fusion reactor that is less complex and less expensive to build than typical fusion reactors. Some embodiments may provide a fusion reactor that