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Performance Assessment of a Fusion Hybrid Reactor Based on the Gasdynamic Mirror TERRY KAMMASH, University of Michigan — A preliminary evaluation of the performance of a fusion hybrid reactor whose fusion component is the gasdynamic mirror (GDM) is presented. Since the primary role of the fusion component is to supply high energy neutrons that will induce fission reactions in a blanket surrounding the plasma, it can operate at or below "break even" condition. Unlike other fusion devices proposed for this component, the GDM is a linear, cylindrically symmetric device that can operate in steady state making it uniquely suited for this application. We investigate the power producing capability of such a hybrid reactor using the thorium fuel cycle whereby neutrons generated by DT reactions in the GDM impinge on a thorium-232 blanket. These 14.1 MeV neutrons will breed uranium-233 in the blanket and simultaneously burn it to generate power. We treat both the fusion component and the blanket as semi-infinite cylinders so that one-dimensional analysis can be applied. The two relevant equations in this regard are the time evolution of the U-233 density in the blanket, and the neutron one dimensional diffusion equation. We address the steady state operation of this reactor and find that it can produce gigawatts of power per cm, safely since it is "subcritical," and securely since the fuel cycle is proliferation resistant. The approach to steady state will also be presented and analyzed.

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