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CHARACTERISTICS OF A PRE DEMONSTRATION FUSION DEVICE*

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ABSTRACT

Low beta reactor system studies have shown that criteria necessitated by the physics lead to difficult engineering problems. The low power density produced in these systems also results in large reactors and makes the question of economic viability a serious one. It is clear that if higher pressure plasmas can be confined and operated, many of these problems could be alleviated. The incentives for high plasma density as a means of achieving higher pressures are discussed. The possible methods of achieving high density are outlined with particular attention to the high beta approaches. The requirements which are imposed on the reactor by using the flux-conserving tokamak concept are described.

The characteristics of a pre-demonstration fusion device which can test the necessary aspects of such a system are developed. The plasma size required to attain ignition is found to be relatively small provided other criteria can be satisfied. These criteria are described and the technology developments and operating procedures required by them are given. The dynamic behavior and parameters of the reference system during the operating cycle are also outlined.

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