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NASA TECH BRIEF

Method for Determining Properties of Microinstabilities of a Magnetized Plasma

A theoretical determination has been made of the properties of microinstabilities that occur in high temperature magnetically-confined plasmas. This study has direct application to experimental research work in controlling nuclear fusion. The foundation gained through this study can be extended to more complex situations which are likely to occur in astrophysical and space physics research.

The study comprises a determination of the plasma density at which absolute instability becomes predominant by using the dielectric properties at this incipient unstable state (relationships between wavelength, frequency and density of microinstabilities are used to derive the spatial dielectric function).

Two types of microinstabilities have been found to occur above the transition density, namely:

(1) Convective instabilities which travel in the plasma and are nondestructive.

(2) Nonconvective instabilities which may arise in any particular region of the plasma and, by their persistent nature, may lead to the destruction of the plasma confinement.

Values of temperature, magnetic field and other relevant parameters of the plasma are used to determine the transition density required for absolute instability of the plasma.

Note:

Documentation is available from:
Clearinghouse for Federal Scientific and Technical Information
Springfield, Virginia 22151
Single document price $3.00
(or microfiche $0.65)

Reference: NASA CR-94641 (X68-16032), Absolute and Convective Microinstabilities of a Magnetized Plasma

Patent status:

No patent action is contemplated by NASA.

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