Re: Traveling Wave Accelerator Coil Injector

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On 7 Feb, 02:17, "American" <samuelran...@xxxxxxxxxxx> wrote:

> A device employing the utilization of charge entrainment in
> an electrohydrodynamic device such as a magnetic injector
> would require that turbulent flow characteristics are cal−
> culated for the fluid in question. I've posted information
> already in an overview of the coil windings.
>
> A total of 600 − 360 coil charging units for the injector
> supplied by a pulse power supply that generates pulses up to
> 30 kv. Multivibrators in conjunction with peripheral components
> adjust the pulse repetition rate. The maximum repetition rate
> equals 20 Hz. for each injector's magnetic induction coil.
> Because of the high intensity magnetic field generated, a
> magnetoresistive shield is required between the circuit
> and coil.
>
> An excellent mathematical model that describes flow rate
> in terms of both hydrodynamic viscosity, n (pronounced 'vue')
> and (p − p_c), as pressure approaches critical uses an eigen−
> value equation to solve for the dimensionless flow rate at
> critical pressure. Eigenvalues for superfluid helium−4 isotope
> are represented in a Fortran program EIGEN that is a
> result of technically investigating that I've dubbed
> "Eigenvalue Solution for Calculating Spectra of 4−He Hydro−
> dynamic Stability for a Magnetohydrodynamic Traveling
> Wave Accelerator".
>
> Traveling Magnetic Wave Interaction and Wave Growth:
>
> For MHD (magneto−hydrodynamic) devices such as a control
> system (for the induction circuit of the pellet launcher)
> traveling magnetic waves propel fuel pellets by using a chamber
> that is magnetically sealed from the return circuit of LMH3
> (liquid magnetic helium 3). In order to arrive at the condi−
> tions for which traveling magnetic wave interaction becomes
> destabilizing, we have to establish the general time dependent
> relations leading to the perturbation relations for small
> magnetic wave interaction. The interaction will produce only

small changes in the average flow quantities under practical conditions and a perturbation analysis is justified despite the very nonlinear nature of the problem.

For partially ionized gases used in conversion devices the electrical conductivity is low and the magnetic Reynolds number is small. Hence low interaction implies small magnetic reaction and the magnetic field due to induced currents can be ignored. We can neglect charge density variations and considering steady state conditions we may ignore convection currents. The generalized Ohm's law is given by:

I / sigma = E + u_r x B + w_e (tau / (sigma)B) I x B

where

E = external electric field
u_r = u − u_lambda = relative or slip velocity
u = plasma velocity
u_lambda = wave velocity
Omega = w_e*t = Hall coefficient
tau = collision period
w_e = e*B / m_e = cyclotron frequency for electrons
e = charge of electron
m_e = mass of electron
I = current in plasma
B = (mue * H) = magnetic flux density

Under one dimensional flow conditions with no externally applied electric field we assume that the induced voltage is absorbed as a resistance drop or E_y = 0. Since no current can flow in the x direction if we consider an infinitely wide channel, we have I_x= 0. Thus the open circuit Hall voltage is E_x = (Omega)u_r*B and the induced current becomes I = (sigma)*u_r*B, which is independent of the Hall effect. What is the Hall effect? It is a disturbance of the lines of current flow in a conductor due to the application of a magnetic field, leading to an electric potential gradient transverse to the direction of current flow. Primarily, we can use the Hall effect for a theoretical basis in pellet acceleration.

The one dimensional interaction of a transverse magnetic wave and a moving plasma is resonant when the relative velocity equals the velocity of sound. Of course, this would not be the case for the design of the pellet injector. Lead titanate, which can sustain a field of over 10**7 volts/meter and dielectric constant of up to 12,000, has a velocity of propogation constant available as a percentage of the speed of light. The field strength for Nb_3Sn at the mixed state* at 4.2oK is 221 kg. Nb_3Sn is a pellet outer skin candidate for several different types of pulse units, not just (Li6D+BLi), but frozen SH as well.

A Slush Technology Facility, also adapted for p−B, (protium−boron or hydrogen−boron) could also be developed as a space−based refueling depot for space−mining facilities).

* The mixed superconductive state is found in which fluxons (a minimal unit of magnetic flux) create lines of normal super−conductor in a superconductive matrix (CRC Handbook of Chemistry & Physics, 57th edition, p. E−86).

And the result is?

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