ZPE-Casimir Inertial Drive

Horace Heffner   July 2003

There has long been a search for a self contained infinite ISP inertial space drive. Such a drive is possible if inertia is indeed a zero point energy (ZPE), i.e. zero point field (ZPF) caused effect, as proposed by authors like Hal Puthoff. I suggest that if the zero point field can be excluded in part from a cavity, then inertia of free-moving bodies in that cavity should be reduced. The Casimir effect is produced by placing conductive surfaces close enough to exclude some of the longer of wavelengths of the ZPF, which is comprised of very short wavelengths. Plate separations greater than atomic dimensions do produce measurable Casimir attraction between conductive plates.

If the assumed principles are true, then an inertial drive can be made by directing a jet in to a Casimir cavity that is bounded such that the jet direction is fluidly reversed. A semicircular cavity shape should work nicely, using an inert gas, like helium or argon, as the propellant. Such cavities could be cut or etched into sandwiched layers of ultrathin dielectrics separating structurally strong metal layers. Alternately, they might be machined by electron beams.

Fig 1. shows a cross section of a single "ZPE thrust cell". An array of roughly semicircular groves of width roughly on the order of to 10^-6 meter are cut into a metallic surface. These are represented in Fig. 1 as the "Thin Cavity". A matched array of thick groves is cut into a strong low density faceplate that is placed over the array of thin cavities such that a continuous gas path is formed from one side of the plate to the other in each row cells, and the entire gas flow (for a given row) is directed through the thin cavity of each cell in that given row. The edge lateral walls of the thick cavities, noted as the "Cross Cavity Flow Barrier" in Fig. 1, are positioned so as to force the gas flow through the thin cavities. The two plates make a 2 dimensional array of thrust cells fed by gas at high pressure from the edges. The plates can be stacked to create a 3 dimensional array of thrust cells. The plates need to be made as light as possible, but the surface of the thin cell need to be conductive in order to exclude ZPF radiation of some frequencies from the cell.

The thrust cell widths might be on the order of 10^-5 m, and a layer of cells on the order of 10^-4 m. This gives a cell density of about 10^5 x 10^5 x 10^4 cells/meter^3 = 10^14 cells/m^3. The cavity depth might be about 10^-5 meter.

On each transition from thick cavity to thin cavity, the gas flow transfers momentum to the walls due to the angular acceleration. The gas "snakes" through the thrust cells. The momentum transferred in the thin cavities is upward in Fig. 1. The momentum transferred in the thick cavities is downward in Fig. 1. Since the same gas flows through all cavities in a row, the mass flow for the cells is identical. If there is no change of inertial mass in the thin cavities, then no net thrust results. However, if the inertial mass of the gas molecules/atoms is less in the thin cavities, then less momentum is transferred toward the top of Fig. 1 by the gas when in the thin cavities, and a net thrust develops downward in Fig. 1.

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       |
       |         ------------------------------           ... Repeated ->
       |        /                              \
       |       /         Thin Cavity            \
       |      /                                  \
       |     /            -->        -->          \
       |    |                                   |   |
       |    |     -->                          v    |            Thrust
       |    |              -->           \          |              |
       ------    ^                        \       ------           |
                /        ------------      v                       v
     Gas -->   /     ^   |          |          -->
                     |   |  Cross-  |
                         |  Cavity  |
         Thick Cavity    |  Flow    |  Thick Cavity
                         |  Barrier |
                         |          |      -->
     Gas -->             |          |             -->
                         |          |
       --------------------          ---------------------
       |
       |                                                     Repeated -->
       |
       ---------------------------------------------------

                  Entire Thrust Cell Layer Repeated
                                |
                                |
                                v           Thrust cell layers can be
                                            stacked into 3D arrays.

       Fig. 1 - Cross Section Diagram of ZPE Thrust Cell Array

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If we use r=10^-5 m, and v= 10^-4 m/s, we get a centrifugal force F = m*(V^2)/r of about 10 N/Kg. The gas flows through an orifice 10^-6m x 10^-5 m, or 10^-11 m^2. Argon is 1.784 g/l. At 10^-4 m/s the flow rate is 10^-14 g/s = 10^-17 kg/s. With an effective r of 10^-5 m, the mass of gas accelerating is 10^-11 m^2 x 10^-5 m = 10^-16 m^3. This is (10^-16 m^3) (1.78x10^3 kg/(1000 cm^3)) (10^2 cm)^3/m^3 = 1.78x10^-10 kg. This gives a very rough thrust per cell of about (10 N/Kg)(1.78x10^-10 kg)/2 = about 10^-9 N = 1x10^-10 kgf. Given 10^14 cells/m^3, we have (1x10^-10 kgf)(10^14 cells/m^3) = 10^4 kg of thrust per cubic meter of cells. However, if the inertial mass reduction is only 0.01 percent, then the thrust is only 1 kg per cubic meter of cells.

The principle problems and unknowns of the design at this point, then, are the (1) amount of inertial mass reduction that can be obtained, and (2) the flow velocity of gas that can be maintained through the thin cavity slots.