Danny Jammooa, Manual catacora

Magnetized Plasma and Alfven waves

After reading our feedback we realized that our topic is still to broad. So within our magnetized plasma topic, we decided to deal with Alfven waves within magnetized plasma. Alfven waves that occur is plasma that has been magnetized. Alfven waves comes in two forms, waves that resemble sound waves and electromagnetic waves. We will be focusing on Alfven waves that take the form of electromagnetic waves in magnetized plasma. Alfven waves are also part of the magnetohydrodynamic field, which we read about earlier in our research.

According to a news article from Science Daily "Discovery of Alfven waves in the corona of the sun", states that scientist assume that the temperature of the corona of the sun is due to powerful Alfven waves. This discovery help explains the high temperatures in the sun's corona. It is said that the plasma move at speeds of 20km/s, where the Alfven waves propagate at high speeds of 200 to 250 km/s.

What we will do is create a jupyter notebook that uses these velocities to estimate the energy these Alfven waves gives, and relate that energy to temperature. Then we will compare the temperature that the Alfven waves produce to the known temperature of the sun's coronoa.

$$\mathrm{AWE} = \iint \left[\frac{(\delta B)^2}{2\mu_0} + \frac{\rho v^2}{2}\right] dxdz = 2 * \mathrm{KE}_{\mathrm{awe}}$$

We will also be producing our own Alfven waves velocity using known information from the sun using these formulas.

$$v = \frac{v_A}{\sqrt{1 + \frac{1}{c^2} v_A^2}} \qquad v_A = \frac{B}{\sqrt{\mu_0 \rho}}$$

Where v is the phase velocity and v_a is the Alfven velocity of these waves, and p is the total mass density of the charged plasma particles.

https://www.sciencedaily.com/releases/2011/08/110801094253.htm

https://arxiv.org/ftp/arxiv/papers/1506/1506.03179.pdf