Building your paper III

Magnetic is magneto, one of the states of matters is hydro, and progress is dynamic. With that, magnetohydrodynamics is the subject of “fluids” that conduct electricity and its magnetic components. The fundamental concept behind this study is that the magnetic fields can induce currents in and consequently polarize plasma, salt water, or liquid metals, changing the magnetic fields itself. Difficultly, the approach for any research is to prove the intended research fits a hypothesis of the magnetic interactions that the solar plasma emits. Nevertheless, nothing is completely proven. Additively, with three decades in their research, there were five cases focused upon. Since the Nobel-Prize winning discovery of magnetohydrodynamics in the sixties, it is unoriginal. Problematically, the kinematics has deficiency in updates to rapid calculations often. Noting these, the cases differentiate based on advancements and technique variations in modeling. After all, what is asked by these studies are the observation of the plasma in the Sun will produce as a model. In turn, this will answer where the energy of the corona is located to heat the plasm. That is where the dissipation of magnetic currents could root out more answers. Mostly, time will tell of the evolution in modeling will attest the magnetic interactions in solar flares. Therefore, will we be aware that the solar corona is magnetically live and well?

When it comes to addressing magnetohydrodynamics, one of the earliest experiments with fluids was done by the father of the electric field himself: Michael Faraday. Formulaically, this experiment was on the salt water and its potential difference from its interaction with the Earth’s magnetic field. Eventually, the Max-Planck-Institut discovered that the coronal loops examined are heated predominantly by Ohmic heating, which is induced by the braiding of field lines through the photospheric motions. Additively, the NASA Astrophysics Data System focused on the footprints of the magnetic loops in the corona that determines the speed of the downflow from its expanding loops. Contrary, the Swedish Institute of Space Physics placed attention on the interaction between the solar wind and solar system objects and its ejections. In addition, there was a study of the gasdynamic models of this planet's magnetosheath from Stanford in 1994. Lately, the current case was the data-driven modeling magnetohydrodynamic modelling done by the SIGMA Weather Group from the Chinese Academy of Sciences.

Previously, each magnetohydrodynamic solution was time-consuming using a Cray YMP computer. During Stanford's and the American Astronomical Society's study, it acknowledges the difficulty of computation. Problematically, this is due to the enormous number of values that must be output to represent a single solution. Critically, Flash Code is a difficult software with modules that mesh hydrodynamic code to model astrophysical thermonuclear flashes. The Stanford paper elevated the comprehensions of the solar active region and its magnetic loops by the details of free energy and drift the focus off of the Flash Code towards the bow shock trends of the models from the Swedish research team. Advancing, that is where the SIGMA study addresses the data. The computational work was carried out in the National Supercomputer Center in Tianjin, China. Their simulation started with a magnetohydrodynamic model that is almost current-free and then focused on the photospheric field in a low plasma condition. The HMI of the supercomputer provided routine vector data of the photosphere with precisional resolution of 1 arc second for any formations of solar eruption. The data are driven by supplying the bottom boundary derived from the Poynting flux. Descriptively, the Poynting is the directional energy flux of an electromagnetic field. Conclusively, the models exemplified that the magnetic free energy continuously increase due to the uninterrupted injection of energy into the volume with graphic models that free energy is proportional to time. This fits the topographic models of evolution in the magnetic field of the coronal as it loops.

Overall, there was an agreement to the delivery of sufficient amount of energy at the base of the corona to heat the plasma based on the magnetic flow of the Sun, expelling solar flares. Regardless, these studies have increased sophistication since the idealized models. What intrigued me is the scale of the polytropic model that requires the interaction of forces by plasma, magnets, and solar gravity. What this adds in the German study is a self-consistent description of the thermal structure of the plasma and of the magnetic field in the coronal structure. All the model had to do was include heat conduction by gravitational force which was done. Specialized, the Swedes studied the interaction of solar winds to solar system objects. This Flash Code method is used to scale magnetohydrodynamic aspects on a smaller scale which is fundamental to classify plasma overall. Additively, Stanford shapes the work of the Swedes on the interaction between the solar wind and solar system objects. Stanford did so by focusing on the terrestrial magnetosheath rather than comets. Contrarily, SIGMA's latest observation builds from the other three studies, with the new emphasis on the modeling of solar eruption. Fundamentally, these studies build on the idea of where the energy of the corona is located to heat the plasma and its effects on the solar system objects. Stanford addressed magnetohydrodynamic components through gasdynamics. Gasdynamics is compressible flow or the branch of fluid mechanics that deals with flows having significant changes in fluid density. Topically, it shares elements of how the corona is live and shifts its magnetic field as its plasma. Conclusively, the magnetosheath of Venus is influenced by the effects of newly ionized neutral atmospheric atoms or molecules and is displayed by modeling bow shocks where the plasma properties from solar flares change from one equilibrium to another. Illustratively, this study is unique for the attention on shockwaves and connection of the bow shocks from observing terrestrial planets to the amount of sunspots. Effectively, the sunspots' magnitude is proportional to the intensity of plasmic solar flares.

Interestingly, they degenerate the magnetosheath of the Moon or any objects like it that they neither have a magnetic field to stop the solar wind plasma before it reaches the surface.

Fascinatingly, the modelling was utilized to elevate beyond observations. Focusing on the German study, three-dimensional model is not enough to resolve the dissipation length scales done with precision, but it provides the redistribution of energy. What I learnt is that it is not necessary to obscure sunspots though, but utilizing x-ray imaging from telescopes, hot loops can be seen by its connection of two extended regions showing opposite polarity. Therefore, there is a strong magnetic field in the Sun. This objective place my concentration of three-dimensional modeling to the topic of solar magnetohydrodynamics. It shifted far from 1992 American Astronomical Society's study by non-linear 2.5D simulation. This model was the inclusion of three-dimensional vector components without its variation. Also, it advanced beyond kinematic-oriented work done by 1998's study in California on coronal holes. Captivatingly definitive, SIGMA explained that the methods to modeling was numerical calculations of time-dependent kinematics with the bottom boundary conditions being proportional to what is observed of the photosphere. Sparingly, the researchers did not consider the physics of the chromosphere to the transition region. Quantumly, this is due to the overall unknown of how the coronal heating is mechanized where temperatures sour from a few to several magnitudes of degrees. Significantly, SIGMA coloured the magnetic loops of previous studies. Relatively, SIGMA traces the German study by observing the active regions of sunspots and its redistribution of energy by graphing the free energy from the solar plasma. Reevaluating the 2013 study, they would define magnetohydrodynamic components in their models by its projections of field lines crossing the maximum of the synthesized emission of the respective loop in the three-dimensional computational domain. For Stanford's then innovative gasdynamic convected magnetic field model, it was derived as a tractable approximation to the magnetohydrodynamic model, using a workstation. The corresponding magnetohydrodynamic solutions and the Earthly and other solar system's observation demonstrate its accuracy and compare it with the solar wind data. Simply, if the field is aligned with the flow, the magnetohydrodynamic equations can be transformed into a simpler set of equations that resemble those of gasdynamic. Mathematically, it adds to the phenomenon portrayed by the Swedish study by the characteristic weak bow shock in all simulations. From the stand-point of bow shocks when observing these models again, the phenomenon of magnetohydrodynamics is based on the drape of the magnetic field from the nucleus of the observed solar system object as it is impacted by the solar wind.

In conclusion, the fundamental concept behind this study is that the magnetic fields can induce currents in and consequently polarize plasma, salt water, or liquid metals, changing the magnetic fields itself with its processes of modeling to identify the global magnetic structure of the Sun. Predictively, for the future studies done on the corona would reproduce the magnetic connections if this magnetosphere still loops. What was garnered was the models' field lines being what would be mentally ingrained when the phenomenon of magnetohydrodynamics comes to mind. Personally, it builds on the impact that computational modeling has advanced far. Earlier, it started from the studies of the solar atmospheric magnetic flux. Later, studies from supercomputers would factor out the entirety of the chromosphere. Phenomenally, the study and models of magnetohydrodynamic will continue to do so. Before computation, many scientists saw to believe that there was a magnetic connection in the solar flare as it pummels our world by observing the Sun. Currently, we can see to believe by believing in supercomputer calculations and its computational models.

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