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Measuring Magnetic Reconnection using X-Ray and EUV Images

A great deal has been learned about the many phenomena driven by the Sun, but one that has remained an enigma is that of magnetic reconnection, the physical process in highly conducting plasmas in which the magnetic fields are rearranged and magnetic energy is converted to kinetic energy, thermal energy, and particle acceleration. It is known qualitatively that magnetic reconnection is fundamental in the formation of coronal loops and the production of solar flares, but much of the quantitative side is unclear. In this research, X-Ray and extreme ultraviolet images are obtained from regions identified to contain examples of magnetic reconnection. From these images, a series of cutouts to zoom in on the active emergence in each image are made. From these cutouts, coronal loops that display magnetic reconnection are identified, and quantitative values of magnetic flux transfer are obtained using an existing modelling code for coronal loops. The modelling parameters include the coronal densities of the loops and voltage drops from the original region to the newly emerged one. These values for voltage are quite large and are around 109 V. Using this knowledge, it should be possible to determine rate and strength of future solar eruptions.