Evolution Of Magnetic Field Configurations Associated With An X-class Flare of AR6919

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We have analyzed a set of MSO(Mees Solar Observatory) magnetograms associated with an X-class flare of AR6919 which occurred on November 15, 1991. The magneotgram data were obtained before and after the flare, using Haleakala Stokes Polarimeter which provides simultaneous Stokes profiles of the Fe I doublet, 6301.5 and 6302.5. A non-linear least square method was adopted to derive the magnetic field configuration from the observed Stokes profiles and a multi-step ambiguity solution method(suggested by Canfield et al.(1993)) was employed to resolve the 180° ambiguity.

From the ambiguity-resolved vector magnetograms, we have derived a set of physical quantities characterized by the field configuration, such as magnetic flux, vertical current density, magnetic shear angle, angular shear, magnetic free energy density, and a measure of magnetic field discontinuity (MAD: Maximum Angular Difference between two adjacent field vectors).

Finally, We have examined their changes before and after the flare occurrence by overlaying them on the associated Yohkoh SXT soft X-ray images. The final results are presented and their interrelationships are discussed.