16.01

Intercomparison of Seven Magnetographs

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Sunspot and active-region magnetograms of NOAA/SEL regions 1794, 1797, and 7801 were obtained during the period 15-19 June 1993 by the Mees Solar Observatory (MSO) Stokes Polarimeter, the Mt. Wilson Observatory (MWO) 150-foot tower magnetograph, the San Fernando Observatory (SFO) Video Spectra-photograph, the Wilcox Solar Observatory (WSO) magnetograph, the NASA/NSO Spectromagnetograph (SPM), the NSO Near Infrared Magnetograph (NIM), and the HAO/NSO Advanced Stokes Polarimeter (ASP). Line-of-sight fluxes measured by SFO, MWO (when corrected by Ulrich's calibration curves), and SPM are in reasonably good agreement (10-20%) for active-region and network fields outside of sunspots; most of the differences are attributable to the seeing. The agreement of large-area averages of SPM and MWO fluxes with SDO data is more variable. Measurements of total field strength in sunspots from MSO/NIM, and ASP are also in good agreement; the field strengths determined by NIM are systematically higher and may reflect a true height variation of magnetic field. Comparable total field strengths are also found in plage regions by NIM and ASP, but the true-field measurements from MSO in these areas are consistently lower than can be accounted for by differences in fill factor. The field inclinations from the ASP are systematically larger than those determined at MSO. Flux measurements in plage and network regions from the longitudinal magnetographs (SFO, MWO, SPM) are all significantly lower than the values inferred from ASP data, even when the latter are averaged to comparable spatial resolution. This discrepancy is not due to differences in reduction algorithms but may imply that spatial averaging of magnetic fields is not equivalent to determining magnetic fields from spatially averaged Stokes profiles.

16.02

Calibrations of the JHU/APL-NSO-USAF Vector Magnetograph.

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We report here on two different kinds of calibration that is needed for the data analysis from the JHU/APL-NSO-USAF Vector Magnetograph. One is the measurement and analysis of instrumental polarization, that is required to compute the Mueller matrices of the entire instrument. The other calibration is the conversion of the observed polarization to magnetic fields.

Four sets of known independent, non-redundant Stokes polarizations are used to find the instrumental Mueller matrix. These 4x4 matrices have been derived for the entire field of view, for each individual pixel on the CCD camera and have been found to be consistent for different non-redundant input Stokes states.