



Image Restoration for MUSER

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Extended Abstract

The MingantU SpEctral Radioheliograph (MUSER) is a solar dedicated interferometric array to produce high quality radio images with high temporal resolution, spatial resolution and frequency resolution at frequency range from 400MHz to 15GHz in Inner-Mongolia of China. The construction has been completed and it is in test observation stage from 2014. Some good images includes quiet sun, burst and Cygnus-A were obtained in recent years. Unlike other images of radio astronomy sources, solar images consist of various components: a solar disk component; some bright compact sources like flares; some faint compact sources; and many diffuse features like active regions, prominences, depressions associated with dark filaments, and plateau-shaped enhancements in polar and coronal-hole regions (H. Koshiishi, 2003). Complicated structures combining these various components made a demand on combination of restoration algorithms. Furthermore, frequency range is ultra-wide band, single and standard deconvolution algorithm is sufficient for MUSER image. So, some deconvolution algorithms in radio astronomy were surveyed, some program scripts in IDL, Matlab and Python were developed and their performance were tested, including hogbom CLEAN, Steer algorithm, Multi-resolution CLEAN, Multi-scales CLEAN. As we knew, Hogbom is better for point-like sources component and Steer algorithm is better for expanded components. Base on MUSER data, a new restoration method combined of these two algorithms for MUSER was proposed. In this method, hogbom CLEAN was applied to process high spatial resolution components and Steer algorithm was applied to process expanded source components. Then two results of two restoration algorithms were combined together. Some examples were shown and some questions were discussed in this presentation.

Keywords. MUSER, Radioheliograph, image restoration