

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Solar System Exploration including Ocean Worlds (5)

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METHODS FOR RECONSTRUCTION OF SOLAR CORONA BASED ON COMPRESSIVE SENSING
OF TOMOGRAPHY IMAGES.

Abstract

Due to high temperatures nature of Solar Corona in relation its surface, astronomers have been trying to describe this behavior for a long time. Several techniques were used, among them, tomography of Solar Corona, which stood out due to nature of emission waves of solar atmosphere, but with limited image quality due to sample rate not being sufficient to Shannon-Nyquist criterion. Compressive Sensing (CS) was a technique developed for medical applications that allows to a signal having a sparse representation to be reconstructed using limited linear measurements taken from a nonsparse representation. Thus this work proposes to evaluate the performance of compressive Sensing based on the preprocessing of the available k-space samples, followed by the reconstruction of filtered versions of the desired image and by a final composition stage that yields a nonfiltered version, in relation to filtered backprojection method, using images from SOHO mission, that have led to the improvement of the quality tomography images in medical applications, and in this way, explore their possibility in the application of Solar Corona analysis. The results show an improvement in both quality index, signal-to-noise ratio (SNR) by up 20.7method. By doing so we can suggest that CS with filtered versions allows an improvement over the Solar Corona images reconstruction, similar to the improvement seen in recent years in the medical imaging problems.