New Solar Telescope (NST), which will be the largest solar telescope in the world, is under construction by New Jersey Institute of Technology (NJIT), University of Hawaii (UH), and Korea Astronomy and Space Science Institute (KASI). There will be active optics (aO) and adaptive optics (AO) in order to improve image quality, and a Correlation Tracker (CT) system which is the simplest form of AO will be applied to Nasmyth focus bench. Especially in this presentation, we will introduce the CT software and its computing performance. The software has been developed via Microsoft Visual C++. The software enables us to take images from the high-speed CMOS camera, to calculate those displacements between the images by using sum of absolute differences (SAD) algorithm, and to control the tip-tilt mirror. We adopted the parallel programming technology (SIMD and OpenMP) based on the Intel Core 2 Quad processor without any additional processing system (FPGA or DSP) for high-speed performance. As a result, we can successfully make a tip-tilt correction over 700 Hz with 64 × 64 pixels in a closed loop mode. The CT system will be installed on the NST in 2009.

[ID-15] A New Calibration of Deep MMT 6.5m Transit Survey Data for Variability Research

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Increasing number of wide-field optical surveys are being conducted for studies of interesting variability such as exoplanet transits and transients. The deep time-series imaging observation by the MMT 6.5m transit survey program did not reveal any transiting planets, but it does provide a rare opportunity to explore optical variability at relatively high temporal resolution (30s ~ 90s). This is the primary goal of our present research project; i.e. the detection of fast and unusual variables. We find however that the light curve archive from the original image subtraction procedure exhibits many unusual outliers, and more than 20% of data get rejected by a simple filtering algorithm. In order to achieve much more accurate photometric precisions and also to make the most efficient use of the data, we are re-processing the entire image database with multi-aperture photometry and carefully tuned calibration procedures. We also added a new index that isolates peculiar situations where photometry returns misleading information. In this presentation, we demonstrate the improvement of data statistics and accuracy as well as potentials for the detection of micro-variability and extremely temporal variability.