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Calibration pipelines for ASKAP

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The Australian Square Kilometre Array Pathfinder (ASKAP) is fundamentally a real-time telescope given the data rate from the correlator to the central processor of 2.5 GB/s.

The calibration pipelines have to keep up with observations and produce a solution on time scales shorter than the time required for calibration data acquisition.

We have previously prototyped the calibration pipelines within the ASKAPsoft's master-worker framework. The prototype implements a straight forward least square solver with an option to have distributed calculation of the normal equations.

It is also easily configurable for different types of measurement equation (e.g. to get gain or polarisation leakage pipelines). However, the performance of the first prototype was found inadequate for real-time operations.

Here we present a new approach based on pre-computing the sums in the expression for the elements of normal matrix during the first iteration.

This approach led to a five times higher performance of the gain calibration while the overall structure of the code had been retained.

Primary author: Dr VORONKOV, Maxim (CSIRO Astronomy and Space Science)

Co-authors: Dr HUMPHREYS, Ben (CSIRO Astronomy and Space Science); Dr CORNWELL, Tim (CSIRO Astronomy and Space Science)

Presenter: Dr VORONKOV, Maxim (CSIRO Astronomy and Space Science)

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