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Fast Scheme for Approximating an Off Set PSF Response

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Abstract content
   (Max 300 words)
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The desire of Wide field of View (FoV), high sensitivity and high resolution has driven radio astronomers to the point of big data revolution where the data is represented in at least four dimensions with axis for spectral frequency, time, baselines and sources. The cost associated with storing and handling these data has been very large for processing (calibration, imaging, etc) and therefore it is desirable to reduce the size of the data as much as possible using data compression techniques. Unfortunately, the well known compression technique "per baseline time/frequency bins averaging" results in a baseline-length dependent loss of signal amplitude and distortion, and creates "smearing" imaging artefact's which are dependent on distance from the image phase centre. We present a new technique to accurately approximate a distort source Point Spread Function (PSF) response and compare the approximate PSF with the Direct Fourier transform (DFT). Furthermore, we show that the computational time of an approximate PSF response scale as the PSF compute with the Graphics Processing Unit (GPU).

Keywords: Sensitivity, resolution, big data , spectral frequency, baselines, compression, averaging, signal, distortion, smearing, PSF, DFT, GPU.

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