# Upgraded GMRT: Preliminary Primary-beam shape parameters

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This note gives the preliminary determination of the beam shape parameters for the upgraded GMRT (uGMRT). These parameters have been determined by fitting an even polynomial (of 8th order) to the measured antenna response. Details of the methodology and results will be available in the form of technical note(s) shortly, but in the interim, the fitted polynomial coefficients are being provided for users who would like to apply primary beam corrections to their images. Such users should note that the values tabulated below should be regarded as preliminary measurements; there may be (hopefully small) corrections at the time of the final release. This note also does not characterize the level of accuracy of the polynomial fits, this and other related issues will be discussed in the technical note(s) which are currently under preparation. For further information please contact Santaji Katore / Jayaram Chengalur (for Band-5 only) and Santaji Katore / Dharam Vir Lal (for all other bands).

**Primary beam Parameters**

The table below lists the coefficients of an eighth order polynomial fit to the antenna primary beam for the different bands of the uGMRT. The fit polynomial is

$$1 + (\frac{a}{10^3})x^2 + (\frac{b}{10^7})x^4 + (\frac{c}{10^{10}})x^6 + (\frac{d}{10^{13}})x^8,$$

where $x$ is in terms of separation from pointing position in arc-minutes times the frequency in GHz. (The terms $a$, $b$, $c$ and $d$ are essentially the same as would be required for PBPARM(3), PBPARM(4), PBPARM(5) and PBPARM(6), respectively in the `AIPS` task `PBCOR`).

Table 1: Coefficients of an eighth order polynomial fit to the antenna primary beam.

| Band | | polynomial coefficients | | | |
|---|---|---|---|---|---|
| | (MHz) | a PBPARM(3) | b PBPARM(4) | c PBPARM(5) | d PBPARM(6) |
| Band–2 | 125-250 | | | | |
| Band–3 | 250-500 | −2.939 | 33.312 | −16.659 | 3.066 |
| Band–4 | 550-850 | −3.190 | 38.642 | −20.471 | 3.964 |
| Band–5 | 1050-1450 | −2.608 | 27.357 | −13.091 | 2.368 |