Upgraded GMRT: primary-beam shape parameters

November 29, 2023

This note gives the updated coefficients of the beam shape parameters for the upgraded Giant Metrewave Radio Telescope (uGMRT). These parameters have been determined by fitting an even polynomial (of 8th order) to the measured antenna response. The updated fitted polynomial coefficients are now being provided for all the bands 5, 4, 3 and 2 of uGMRT.

This short note does not characterize the level of accuracy of the polynomial fits; this, including details of the methodology, results and other related issues are discussed in the technical note(s) for bands 2, 3, 4 and 5, available at

http://www.gmrt.ncra.tifr.res.in/gmrt_users/help/help.html .

More information, if any 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 8th 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-min 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, with PBPARM(1) = 0.1 and PBPARM(2) = 1, in the "classic" AIPS task PBCOR. Similarly, we have included these parameters in the CASA6 compatible task ugmrtpb, available at

https://github.com/ruta-k/uGMRTprimarybeam-CASA6 .

More information, if any please contact Ruta Kale / Dharam Vir Lal.

Table 1: Coefficients of an 8th order polynomial fit to the antenna primary beam.

observing band		polynomial coefficients			
		a	b	c	d
	(MHz)	PBPARM(3)	PBPARM(4)	PBPARM(5)	PBPARM(6)
Band–2	125-250	−3.089	39.314	−23.011	5.037
Band–3	250-500	−3.129	38.816	−21.608	4.483
Band–4	550-850	−3.263	42.618	−25.580	5.823
Band–5	1050-1450	−2.614	27.594	−13.268	2.395