

# Best-fit Parabola for GMRT Antennas:

Derived from Surface-RMS data

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## 1 Introduction :

The RMS deviation of the mesh-surface of GMRT dish from the true-design geometry has been measured by a theodolite survey technique.[1]. Data for 15 or more antennas had been archived. Apart from estimating the rms deviations, the analysis package has a secondary purpose: of determining the best-fit parabola for every GMRT antenna so that the surface errors are minimised for the best-fit case. Details of the method of measurement, the underlying theory for analysis and usage of the software package can be found in [1].

## 2 Best-fit Parabola :

As mentioned above, the Best-Fit Parabola (BFP) is determined such that the surface errors are minimised for that set of data (of the specific antenna); hence it is a hypothetical parabola geometry whose relevant parameters alone are compiled and furnished here.

The following Table gives

- F, focal length of the BFP
- $\Delta\theta$  , angle between the BFP's symmetry-axis and that of the dish under measurement
- $\Delta\phi$  , the azimuth rotation angle of the BFP such that the 'best-fit' is obtained for the surface under examination

Fig.1 illustrates the above parameters. The azimuth zero is with respect to angle-bisector between PRF#1 and PRF#16 and measured ccw-direction as positive.

The focal distances, specified in the Table are:  
 $F_0 = 18540$  mm. and  $\Delta F = F_0 - F$

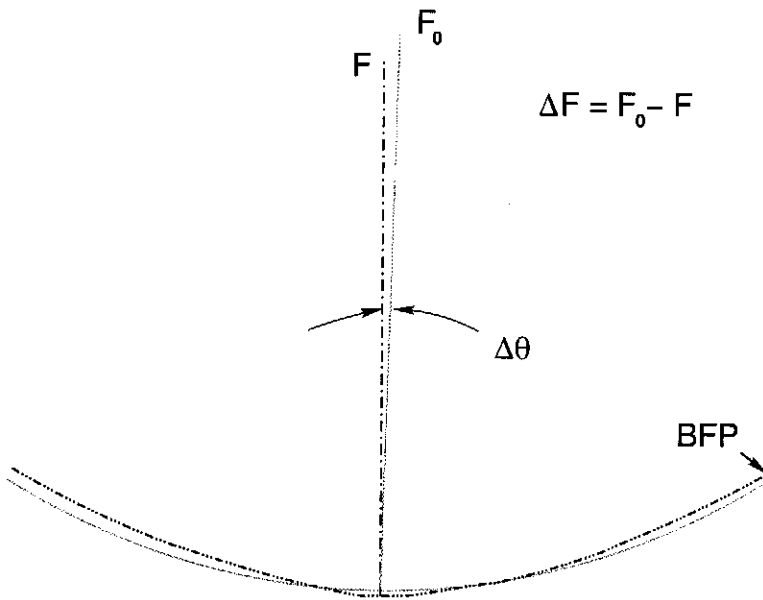
Antenna	Focal length		Angular parm.	
	F (mm.)	$\Delta F$ ,mm.	$\Delta\theta$ ,d:m:s	$\Delta\phi$ ,d:m:s
C03	18483.0	57.0	0:4:23	129:10:10
C02	18494.8	45.2	0:0:00	74:32:25
C04	18546.7	- 6.7	0:0:49	52:32:45
C01	18506.4	33.6	0:1:31	201:06:34
C09	18540.1	- 0.1	0:1:39	98:43:11
C08	18521.5	18.5	0:1:10	343:12:49
C05	18529.8	10.2	0:1:58	18:37:10
C11	18523.3	16.7	0:1:35	200:17:27
C00	18539.2	0.8	0:0:21	23:08:44
C06	18522.7	17.3	0:2:05	344:05:18
W01	18496.6	43.4	0:3:16	181:19:48
W02	18505.7	34.3	0:0:37	168:24:26
W03	18511.3	28.7	0:1:01	167:26:42
W04	18503.3	36.7	0:1:37	174:26:20
W05	18563.2	-23.2	0:2:23	215:10:23
W06	18509.6	30.4	0:3:36	38:01:30
E03	18489.3	50.7	0:3:07	197:36:57
E04	18584.9	-44.9	0:1:32	45:02:45
E06	18557.8	-17.8	0:1:42	210:06:41

Col.2 and 3 will be of interest to 21-cm. band users.

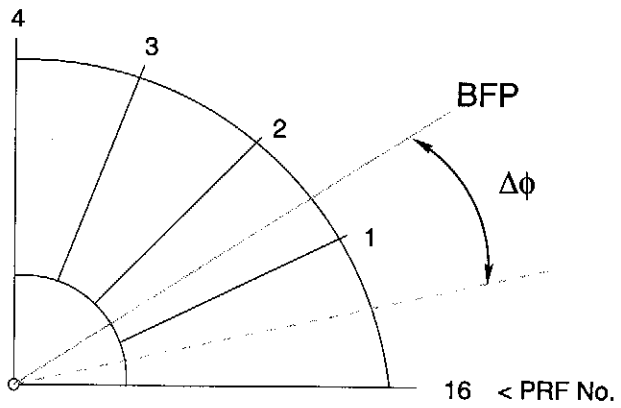
### 3 Reference :

[1]. Aswathkumar Narayan, "Report on the Calculation of RMS Deviation of GMRT Antenna", Int.Tech.Report,1994.

Figure 1: [ AG/2001 - 01 ]



Best Fit Parabola Geometry



Azimuth view of BFP