

## A STATISTICAL ANALYSIS OF THE ANGULAR SIZE FLUX DENSITY RELATION

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This is a brief description of the investigation by Dr. S.M. Chitre and myself, of the  $\theta$ - $s$  relation from the Ooty and 3CR surveys. The  $\theta$ - $s$  diagram has considerable scatter of the wide range of power and size distributions of radio sources, as well as the projection effects. Indeed, the scatter in the  $\theta$ - $s$  is worse than that in the optical  $m$ - $z$  relation, even for the QSO's. Just as it is impossible to determine the Hubble constant reliably from the  $m$ - $z$  plot for the QSO's alone, so it appears ambitious to arrive at unambiguous cosmological conclusions from the present  $\theta$ - $s$  data. A single statistic like  $\theta_m(s)$  used by Drs Swarup and Kapahi cannot do justice to the information content of the  $\theta$ - $s$  scatter diagram.

To show this we have used two independent tests of the data. The first one is a modified form of the familiar  $\chi^2$ -test which takes into account the variable (and unknown) areas of the sky covered by the Ooty survey. The second test uses ranking techniques which properly take into account the dispersion of the median  $\theta_m(s)$ . The tests are used to compare the observed plot with that predicted by evolutionary and non-evolutionary models. A wide range of models of both types are consistent with the data at 1% level. The Kapahi model for  $n = 1.5$  appears to be ruled out by the  $\chi^2$ -test while a non-evolutionary model with a mild power-size correlation survives. Data with considerably reduced scatter is needed to draw any meaningful cosmological conclusion.

*Kapahi:* It seems to me that in comparing the predictions of the Steady State and the evolutionary model with the observed  $\theta$ - $s$  correlation, Dr. Narlikar has chosen rather unrealistic parameters for the luminosity function and the size function which minimize the discrepancy between the steady state and the observations. For the evolutionary model however, he has used a value of  $n = 1.5$  which is not the best fit value.

*Narlikar:* In choosing the parameters described by me other checks besides the  $\theta$ - $s$  relation were performed. For example, the  $N$ - $\theta$  relation was taken into account in the 3C-R part in the same way as done by you. Also, a predicted nearby sample on the basis of this model does not seem to disagree with what we know about the luminosity-size distribution of radio sources.

As regards the second point, the cases  $n = 1, 1.1$  etc. have not been examined in this way. Prof. Swarup tells me that he finds the minimum  $\chi^2$  for these cases is better than for  $n = 1.5$ . In that case, it illustrates the power of the proposed minimum  $\chi^2$  test in distinguishing between different values of  $n$ . My own interest in the problem was not to look for the best  $n$  but to show that at present the data does not rule out non-evolutionary models.