

ARRAY ANTENNA DESIGN CONCEPTS

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Radio astronomy arrays with very large numbers of antennas are being planned, and the development of advanced design concepts can achieve significant total cost savings for these programs. The new arrays have large surface areas, so new methods of manufacture and production-line type assembly must be considered. A blend of past antenna construction technology, creativity, and new technology is needed to provide the best possible telescope for the proposed science goals. Development costs are significantly diluted by the great quantity of antennas required. Key concepts for antennas for large arrays will be presented as follows:

SHELL REFLECTORS: Traditional large microwave reflectors (mirrors) have been made up of many panels. More cost effective designs result when the surface is a continuous shell that can significantly contribute to the structural integrity of the reflector. Both stretch formed and hydroformed reflectors provide a continuous structural shell.

ADVANCED CONCEPTS FOR REFLECTOR AND MOUNT GEOMETRY: New geometry materially reduces initial and operating cost. Traditional geometry is contrasted to advanced geometry. Placing the elevation axis near the reflective surface reduces axis wind torque. Such reduction reduces initial cost and operating expenses for the axis drives. Such placement is allowed by innovative "throated" reflector back structure designs. A short pedestal is allowed by axis eccentricities.

Progress in the development of these concepts for the S. K. A. program will be reported. Pictures of structural arrangements, results of structural stress and deflection analysis and resultant surface error, resonant frequency and pointing error will be reported. Manufacturing, shipping and alignment concepts for shell antennas will be discussed.

Abstract Submission Form

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2. J - Radio Astronomy
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4. I - Invited Paper, Program
chair: Padin
5. FOR SESSION: Mirror
Fabrication, Alignment and
Metrology for Radio
Telescopes, Comm J. Session
chair: Steve Padin