Composite 18m Antenna Reflector for the ngVLA
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The ngVLA reference design calls for 244, Ø18m antennas and 19, Ø6m antennas which constitute >50% of the overall project cost. Canada, through National Research Council of Canada – Herzberg Astronomy and Astrophysics (NRC-HAA), is contributing to the reference design with design studies of both antenna sizes based on the Single-piece Rim-supported Composite (SRC) technology developed by NRC-HAA. This presentation will provide an overview of the development that NRC-HAA has performed to meet the ngVLA requirements with SRC technology.

The SRC technology was developed as a means of producing high performance radio reflectors using advanced materials and mass production techniques to meet the challenge of new large radio astronomy arrays. Repeatable production through application of standard industrial quality control techniques with the mould-based technology and the use of advanced composite materials enables light, stiff, thermally stable structures to be achieved at competitive costs.

To date NRC-HAA has produced Ø15m reflectors capable of operation up to 50GHz. The ngVLA requirement to operate up to a maximum frequency of 116 GHz requires much higher surface accuracy and pointing performance. To meet these requirements development has involved all aspects of the technology; structural design, materials selection (RF and structural), manufacturing process and tooling design.

Composite materials require the use of specialized engineering tools and techniques and in addition, the use of shaped optics for the ngVLA has meant adopting new methods of analyzing the RF performance of the reflectors under operational conditions. Extensive use of state-of-the-art engineering tools to design, optimize and analyze has resulted in a cost effective novel design applicable to both antenna sizes.