

IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)  
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DUAL REFLECTOR ANTENNA WITH A CIRCULARLY POLARIZED RECONFIGURABLE  
REFLECTARRAY AS SUBREFLECTOR**Abstract**

For radars and long distance communications, the high gain antenna is required which relies upon the parabolic antennas where the beam steering and beam shaping is provided by mechanical movement. Reflectarray antennas are suitable candidates for new generation space antennas due to their low cost, ease of manufacturing and reconfigurability.

In this project, a high gain dual reflector antenna is proposed. Dual reflector structure is wideband and more flexible in beam shaping and beam synthesis while having the reflectarray as a subreflector. The radiated beam from a feed horn can be reflected by a subreflector in order to create a virtual source spot in the focal region of the main reflector. Displacement of the virtual source from the focal point of the main reflector, leads to narrow-angle scanning which is suitable for geostationary applications such as broadband satellite internet services, TV and radio broadcasting and weather forecasting.

The antenna system proposed will have to operate in circular polarization to meet the requirement of modern satellite systems. This will require the design of special reflectarray cells. Variable rotation technique will be implemented in this work which obtains a proper phase adjustment in the bandwidth. The circular ring patch elements are used as subreflector elements instead of electronic beam forming elements due to their low cost, high power handling and ease of reconfigurability. The elements are rotated by miniature motors in order to scan the beam in desired region.

The proposed structure keeps the desired features of existing reflector systems, such as low cross-polarization, frequency bandwidth, sustainability in the harsh space environment and high power efficiency. The antenna has the functionality to achieve a high gain and has the property of shaped beam and beam scanning, which is a significant requirement for space and radar antennas.