EXTREMELY COMPACT WIRE ANTENNAS FOR WIRELESS DATA TELEMETRY IN A RETINAL PROSTHESIS

Keyoor Gosalia, Gianluca Lazzi
NC State University, Raleigh, NC 27695-7914

In this work, compact planar wire dipole antenna geometries' impedance matching properties and compression efficiencies are compared with respect to their use as intraocular (embedded) elements in a retinal prosthesis. A novel method of matching a specific planar meander line dipole antenna at its higher order mode (full wave resonance) will be discussed and compared with the conventional technique of matching the fundamental mode. For this planar meander wire antenna a minor offset in the feed point—introduced by shortening one of the dipole arms can induce a current phase reversal and provide an impedance match while retaining the feed point at the structure's symmetrical center. It will be demonstrated that phase reversal on wire antenna configurations possessing a high degree of current vector alignment among adjacent wire lengths can improve the broadside directivity, albeit at a deterioration in the bandwidth.

An edge fed planar meander line dipole antenna measuring $5.25 \times 5.25 \times 1.5$ mm is implemented to operate at 1.4 GHz for its use as an intraocular element in a retinal prosthesis. This wire dipole antenna is impedance matched using the current phase reversal technique. Coupling measurements (between an external patch antenna and the compact wire dipole antenna) were performed both in free space and with the wire dipole antenna embedded in an eye model. These measured results were compared with corresponding results obtained using an embedded compact microstrip patch antenna. At a fixed separation of 25 mm, the coupling in free space and in the presence of the eye model using the planar meander wire dipole (as the intraocular element) is higher than that observed with the compact microstrip patch antenna. Comprehensive measurement results comparing the performance of such a data telemetry link using both (patch and wire) types of antennas will be presented.

Abstract Submission Form

2004 National Radio Science Meeting

Abstract: lazzi25271

Date Received: September 23, 2004

1. (a) Gianluca Lazzi
322-B EGRC
Campus Box 7914
NC State University
Raleigh, NC
27695-7914 USA
lazzi@ncsu.edu
(b) 9195133685
(c) 9195152285

2. K - Electromagnetics in Biology and Medecine

3. (a)

4. C - Contributed Paper

5. No special instructions