Manuscript ID : 00000-61271

Source ID : 00000004

International Journal of Electronics and Communication Engineering and Technology

Volume 5, Issue 5, May 2014, Pages 27-35, Page Count - 9

MULTI-SEGMENT CYLINDRICAL DIELECTRIC RESONATOR ANTENNA

Ranjana Singh [1] Amit Kumar [2]

[1] Communication Department, Galgotias University, Greater Noida, Uttar Pradesh, India.
[2] School of Electrical, Electronics and Communication, Galgotias University, Greater Noida, Uttar Pradesh, India.

Abstract
A novel and simple design of a wideband multi-segment cylindrical DRA which is fed by a micro-strip line for broadband operation is proposed in this paper. The proposed structure has a bandwidth of 2GHz from 6.5 to 8.5 GHz which is 50% of the frequency range ranging from 6 to 10 GHz having resonant frequency at 7.408GHz. Reflection coefficient(S11) at resonant frequency is - 66.01dB. Overall Gain is 5.44dB and radiation efficiency is -0.2825dB that is antenna is 93.70% efficient. Total height of proposed structure is 10mm. This low profile antenna is suitable for wireless systems like WLAN, WiMAX, C-Band applications. Simulation is done using CST MICROWAVE STUDIO-10. Details of the proposed antenna and simulated results are presented and discussed.

Author Keywords
Dielectric Resonator Antenna (DRA), Impedance Bandwidth (IBW), Perfect Conductor (PEC), Radiation Efficiency, Reflection coefficient (S11), Resonant Frequency

ISSN Print: 0976-6464
ISSN Online: 0976-6472
Source Type: Journals
Document Type: Journal Article
Publication Language: English
DOI:
Abbreviated Journal Title: IJECET
Access Type: Open Access
Publisher Name: IAEME Publication
Resource Licence: CC BY-NC
Major Subject: Physical Sciences
Subject Area classification: Engineering and Technology
Subject area: Electronics Engineering
Source: SCOPEDATABASE

Reference

References (23)

1. R.K. Mongia and P. Bhartia
DRA- A review and general design relation for resonant frequency and bandwidth

(1994) International Journal of Microwave and Millimeter wave computer aided engineering, Volume 4, Issue 3, Page No 230-247,

2. O. M. H. Ahmed and A. R. Sebak
Size reduction and bandwidth enhancement of a UWB hybrid dielectric resonator antenna for short range wireless communications

(2010) Progress in Electromagnetics Research Letters, Volume 19, Page No 19–30,
Article Link: https://www.semanticscholar.org/paper/Size-Reduction-and-Bandwidth-Enhancement-of-a-UWB-Ahmed-Sebak/60c34fc847fda86e35c73a09a0d92ecb362d9f31

3. S. M. Shum and K. M. Luk
   Stacked Annular Ring Dielectric Resonator Antenna Excited by Axi-Symmetric Coaxial Probe

   (1995) IEEE Transactions on Antennas and Propagation, Volume 43, Issue 8, Page No 889 - 892,
   Article Link: https://ieeexplore.ieee.org/document/402212

4. P.Rezaei, M.Hakkak and K. Forooaghi
   Design of wideband dielectric resonator antenna with a two segment structure

   (2006) Progress In Electromagnetics Research, Volume 66, Page No 111-124,
   Article Link: http://www.jpier.org/PIER/pier.php?paper=06110701

5. James K. Plourde and Chung-L1 Ren
   Application of Dielectric Resonators in Microwave Components

   (1981) IEEE Transactions on Microwave Theory and Techniques, Volume 29, Issue 8, Page No 754-770,
   Article Link: https://ieeexplore.ieee.org/document/1130444

6. M. Saed and R. Yadla
   Microstrip-fed low profile and compact dielectric resonator antennas

   (2006) Progress In Electromagnetics Research, Volume 56, Page No 151–162,
   Article Link: https://www.jpier.org/PIER/pier56/10.0504141.Saed.Y.pdf

7. Michal Okoniewski, Maria A. Stuchly
   A study of the handset antenna and human body interaction

   (1996) IEEE Transactions on Microwave Theory and Techniques, Volume 44, Issue 10, Page No 1855 - 1864,
   DOI: https://ieeexplore.ieee.org/document/539944
   Article Link: https://ieeexplore.ieee.org/document/539944

8. Ittipiboon and R. K. Mongia
   Theoretical and experimental investigations on rectangular dielectric resonator antennas

   (1997) IEEE Transactions on Antennas and Propagation, Volume 45, Issue 9, Page No 1348 - 1356,
   DOI: https://doi.org/10.1109/8.623123
   Article Link: https://ieeexplore.ieee.org/document/623123

9. Stuart A. Long, Mark W. McAllister and Liang C. Shen
   The resonant cylindrical dielectric cavity antenna

   (1983) IEEE Transactions on Antennas and Propagation, Volume 31, Issue 3, Page No 406 - 412,
   Article Link: https://ieeexplore.ieee.org/document/1143080

10. R. C. Gupta and S. P. Singh
    Mutual Coupling Between Box-Horn Elements of a Phased Array Terminated in Three-layered Bio-Media

    (2007) IEEE Transactions on Antennas and Propagation, Volume 55, Issue 8, Page No 2219 - 2227,
    Article Link: https://ieeexplore.ieee.org/document/4286005

11. Darko Kajfez and A. A. Kishk
    Dielectric Resonator Antenna- Possible Candidate for Adaptive Antenna Arrays

    (2002) Proceedings VITEL 2002, International Symposium on Telecommunications, Next Generation Networks,

Article Link: https://ieeexplore.ieee.org/document/1203411

12. A.A.Kishk, B. Ahn, and D. Kajfez
Broadband stacked dielectric resonator antennas

IET, Electron Letters, Page No 1232 – 1233,
Article Link: https://digital-library.theiet.org/content/journals/10.1049/el_19890826

13. Christopher S. De Young, Stuart A. Long
Wideband Cylindrical and Rectangular Dielectric Resonator Antennas

IEEE Antennas and Wireless Propagation Letters, Volume 5, Page No 426 - 429,
DOI: https://doi.org/10.1109/LAWP.2006.883952
Article Link: https://ieeexplore.ieee.org/document/1715661

14. Petosa, A., A. Ittipiboon, M. Cuhaci, and R. Larose
Bandwidth improvement for a microstrip-fed series array of dielectric resonator antennas

(1996) Electronics Letters, Volume 32, Issue 7, Page No 608–609,
Article Link: https://ieeexplore.ieee.org/document/4473036

15. Eshrah, I. A., A. A. Kishk, A. B. Yakovlev, and A. W. Glisson
Theory and implementation of dielectric resonator antenna excited by a waveguide slot

(2005) IEEE Transactions on Antennas and Propagation, Volume 53, Issue 1, Page No 483 - 494,
DOI: https://doi.org/10.1109/TAP.2004.838782
Article Link: https://ieeexplore.ieee.org/document/1377626

16. Al-Zoubi, A. S., A. A. Kishk, and A. W. Glisson
Analysis and design of a rectangular dielectric resonator antenna FED by dielectric image line through narrow slots

(2007) Progress In Electromagnetics Research, Volume 77, Page No 379–390,

17. Lee, R. Q. and R. N. Simons
Bandwidth enhancement of dielectric resonator antennas

(2013) 2013 IEEE International Conference on RFID-Technologies and Applications (RFID-TA),
Article Link: https://ieeexplore.ieee.org/document/6694520

18. Raghvendra Kumar Chaudhary, Kumar Vaibhav Srivastava and Animesh Biswas
An Investigation on Three Element Multilayer Cylindrical Dielectric Resonator Antenna Excited by a Coaxial Probe for Wideband Applications

(2010) 2010 IEEE Asia-Pacific Conference on Applied Electromagnetics (APACE),
DOI: https://doi.org/10.1109/APACE.2010.5720088
Article Link: https://ieeexplore.ieee.org/abstract/document/5720088/similar#similar

19. Mohsen Khalily, Md. Kamal A. Rahim, Ahmed A. Kishik, ShadiDanesh
Wideband P-Shaped Dielectric Resonator Antenna

(2013) Radio-Engineering, Volume 22, Issue 1, Page No 281-285,
Article Link: https://www.researchgate.net/profile/Mohsen-Khalily/publication/261548095_Wideband_P-Shaped_Dielectric_Resonator_Antenna/links/0f31753577876391820000000/Wideband-P-Shaped-Dielectric-Resonator-Antenna.pdf

20. B.Ramarao, M.Aswini, D.Yugandhar and Dr.P.V.Sridevi
Dominant Mode Resonant Frequency of Circular Microstrip Antennas with and without Air Gap

(2012) International Journal of Electronics and Communication Engineering & Technology, Volume 3, Issue 1, Page No 111 - 122,

Article Link: https://www.slideshare.net/iaeme/dominant-mode-resonant-frequency-of-circular-microstrip-antennas-with-and-without-air-gap

21. Rajni and Anupma Marwaha
    Role of Geometry of Split Ring Resonators in Magnetic Resonance of Metamaterials

    (2013) International Journal of Electronics and Communication Engineering & Technology, Volume 4, Issue 7, Page No 279 - 285, Article Link: https://www.academia.edu/5336070/Role_of_Geometry_of_Split_Ring_Resonators_in_Magnetic_Resonance_of_Metamaterials

22. Jitendra Kumar and Navneet Gupta
    Design of Omnidirectional Linearly Polarized Hemispherical DRA for Wideband Applications

    (2013) International Journal of Electronics and Communication Engineering & Technology, Volume 4, Issue 7, Page No 261 - 268,

23. Varun Shukla, Arti Saxena and Swati Jain
    A New Rectangular Dielectric Resonator Antenna Compatible for Mobile Communication or Broadband Applications

    International Journal of Electronics and Communication Engineering & Technology, Volume 3, Issue 2, Page No 360 - 368,