



Scopus

Document details

[< Back to results](#) | 1 of 2 [Next >](#)[Export](#) [Download](#) [Print](#) [E-mail](#) [Save to PDF](#) [Add to List](#) [More... >](#)[View at Publisher](#)Progress In Electromagnetics Research M
Volume 40, 2014, Pages 101-110

Open Access

Review and assessment of electromagnetic wave propagation in sand and dust storms at microwave and millimeter wave bands - part ii (Article)

Musa, A. , Bashir, S.O., Abdalla, A.H. 

Department of Electrical and Computer Engineering, International Islamic University Malaysia, Malaysia

Abstract

[View references \(34\)](#)

Suspended particles in the atmosphere during sand and dust storms have numerous consequences on electromagnetic wave propagation in arid regions. The electromagnetic wave signal may suffer attenuation and cross polarization upon encounter with the suspended particles. However, meager information has hitherto been reported about effect of storms on the telecommunication systems operating in such regions. This paper presents a survey of current understanding of the electromagnetic wave propagation in sand and dust storms. A review of the literature covering electromagnetic scattering theory and applications is given. The review describes the principle of approach and technology adopted for the investigation highlighting both strengths and drawbacks. Detailed parametric assessment of the effects of storms on wave propagation as it concerns signal attenuation and cross polarization is also carried out. The results demonstrate that most authors have calculated the attenuation effect, revealing that it is not very significant unless very high suspended dust densities are assumed (i.e., during severe sand and dust storms). A few papers indicate the possibility of more significant cross polarisation. The obvious gap in knowledge of this field is finally also clearly established. © 2014 Electromagnetics Academy. All Rights reserved.

Indexed keywords

Engineering controlled terms: [Arid regions](#) [Circular waveguides](#) [Dust](#) [Electromagnetic wave polarization](#)
[Electromagnetic wave propagation](#) [Millimeter waves](#) [Sand](#) [Storms](#)

[Attenuation effect](#)
[Cross polarizations](#)
[Cross-polarisation](#)
[Electromagnetic scattering](#)
[Millimeter-wave band](#)
[Signal attenuation](#)
[Suspended dust](#)
[Suspended particles](#)

Engineering main heading: [Electromagnetic wave attenuation](#)

ISSN: 19378726
Source Type: Journal
Original language: English

Document Type: Article
Publisher: Electromagnetics Academy

Metrics  [View all metrics >](#)

1 Citation in Scopus
15th Percentile

0.16 Field-Weighted
Citation Impact

PlumX Metrics Usage, Captures, Mentions,
Social Media and Citations
beyond Scopus.

Cited by 1 document

An Experimental Study of FSO
Link Performance in Desert
EnvironmentEsmail, M.A. , Fathallah, H. ,
Alouini, M.-S.
(2016) *IEEE Communications
Letters*[View details of this citation](#)Inform me when this document
is cited in Scopus:[Set citation alert >](#)[Set citation feed >](#)

Related documents

Review of radar signal
attenuation due to sand and dust
stormsAlhuwaimel, S. , Mishra, A. ,
Inggs, M.
(2012) *Proceedings of the 2012
International Conference on
Electromagnetics in Advanced
Applications, ICEAA'12*Review and assessment of
electromagnetic wave
propagation in sand and dust
storms at microwave and
millimeter wave bands — Part I
Musa, A. , Bashir, S.O. , Abdalla,
A.H.

References (34)

[View in search results format >](#)

All [Export](#) [Print](#) [E-mail](#) [Save to PDF](#) [Create bibliography](#)

-
- 1 Al-Hafid, H.T., Gupta, S.C., Ibrahim, M.
Propagation of microwaves under adverse sand storm conditions of Iraq
(1980) *Proc. North American Radio Science Meeting, URSI F.5, AP-S*, p. 274. Cited 4 times.
-
- 2 Ansari, A.J., Evans, B.G.
Microwave propagation in sand and dust storms

(1982) *IEE Proceedings F: Communications Radar and Signal Processing*, 129 (5), pp. 315-322. Cited 52 times.
doi: 10.1049/ip-f-1.1982.0047

[View at Publisher](#)
-
- 3 Bashir, S.O.
Electromagnetic scattering computation methods for very small particles: Part II
(2008) *Intern. Conf. On Modelling and Simulation*, 9 (1-3).
-
- 4 Bashir, S.O.
Statistical modelling of propagation parameters through sand/dust storms at microwave frequencies
(2009) *IEEE Intern. Conf. In Antennas, Propagation and Systems*
Johor Bahru, Malaysia
-
- 5 Bashir, S.O., Dissanayake, A.W., McEwan, N.J.
PREDICTION OF FORWARD SCATTERING AND CROSS-POLARIZATION DUE TO DRY AND MOIST HABOOB AND SANDSTORMS IN SUDAN IN THE 9.4 GHz BAND.

(1980) *Telecommunication journal*, 47 (7), pp. 462-467. Cited 10 times.
-
- 6 Bashir, S.O., Musa, A.A., Hassan, A.-A., Khalifa, O.O.
Electromagnetic scattering computation methods for very small spheroidal dust particles: Theory and applications

(2013) *Middle East Journal of Scientific Research*, 13 (SPLISSUE), pp. 38-42. Cited 2 times.
[http://www.idosi.org/mejsr/mejsr13\(mae\)13/6.pdf](http://www.idosi.org/mejsr/mejsr13(mae)13/6.pdf)
doi: 10.5829/idosi.mejsr.2013.13.mae.99914

[View at Publisher](#)
-
- 7 Chen, X.
Observe the influence of sand dust storm on radio communication in Gulf War
(1991) *Electric Wave Antenna*, 6, p. 2. Cited 3 times.
-
- 8 Chen, H.-Y., Ku, C.-C.
Microwave and millimeter-wave attenuation in sand and dust storms

(2012) *2012 19th International Conference on Microwaves, Radar and Wireless Communications, MIKON 2012*, 2, art. no. 6233610, pp. 527-532. Cited 5 times.
ISBN: 978-145771435-1
doi: 10.1109/MIKON.2012.6233610

[View at Publisher](#)
-

(2014) Progress In Electromagnetics Research M

Effect of sand and dust storms on microwave propagation

Dong, Q.-F. , Li, Y.-L. , Xu, J.-D.
(2013) *IEEE Transactions on Antennas and Propagation*[View all related documents based on references](#)[Find more related documents in Scopus based on:](#)[Authors >](#) [Keywords >](#)