

论文

沙尘暴电效应的实验观测研究

张鸿发;王;涛;屈建军;言穆弘

中国科学院寒区旱区环境与工程研究所, 兰州 730000

摘要: 利用国内大型风沙物理风洞实验模拟沙尘暴电现象, 研究风沙起电机理, 结果表明, 不同风速下不同沙粒会产生不同极性的电场强度和电位效应, 风沙电随风速增大而增强, 且随沙粒度增大而减小. 在沙漠区的16m, 8m, 4m和1m高度上观测到27次不同沙尘暴天气过程的电场和风速随时间变化. 结果表明, 在晴天4个高度上的电场均为小正电场值, 电场随高度降低而减小, 最大电场强度在5kV/m以下, 日风速变化对各层电场起伏没有较大影响. 有沙尘天气, 各高度上的电场强度随风速变化而变化. 16m高度上电场均为负值, 平均值为 -20kV/m; 中层8m 电场一般为较高正电场值, 达到10~40kV/m, 与16m高度上电场呈反相关; 下层1m 电场值变化一般很小, 在1kV/m以下. 在强沙尘暴天气4个高度上的电场均为负电值, 电场值随高度降低而减小, 16m高度上最大平均电场强度达到-200kV/m以上, 瞬时值超过 -2500kV/m, 与晴天电场矢量相反.

关键词: 风洞模拟实验 风沙起电 非对称摩擦 沙尘天气电场 结构 沙尘暴电效应

An Experimental and observational study on the electric effect of sandstorms

ZHANG Hong Fa;WANG Tao;QU Jian Jun;YAN Mu Hong

Institute of Environment and Engineering for Cold and Arid Region, Chinese Academy of Sciences, Lanzhou 730000, China

Abstract: The results of wind tunnel experiment simulation for blown sand electrification show that the sands of different particle sizes at certain speeds can produce varied electric field intensities and electric potentials of different polarities. Blown sand electrification intensifies becomes large with increase of wind velocity and weak with enlargement of sand particle size. Twenty seven times of observations to the electric field and wind velocity associated with varied sandstorms have been made at the height 16m, 8m, 4m, and 1m at a desert area. During fine days, the electric field at these four heights has positive values which decrease with reducing height with the maximum intensity less than 5kV/m. And the daily change of wind speed has no major influence on the fluctuation of the electric field at each height. During days with blown sand, the intensity of electric fields at all heights change with wind speed. The electric field at the height 16m is negative, with the average value -20kV/m. At the height 8m, the electric field is positive and as large as 10~40kV/m, which is oppositely correlated to that at the height 16m. At the height 1m, the electric field changes little, and its magnitude is below 1kV/m. During the days of strong sandstorm, the electric field at the four heights are all negative and its values decrease with reducing height. Among them the maximum average intensity of electric field at 16m

Keywords: Wind Tunnel Simulation Experiment Blown Sand Electrification Asymmetric Rubbing Electric Structure of Sandstorm Weather Sandstorm Electric Effect

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