

(Article: 17)

# SOLAR IRRADIANCE DATA TRANSMISSION BASED ON QUASI REAL TIME LOSSLESS COMPRESSION ALGORITHM

Soumya Roy<sup>1</sup>, Sankar Narayan Patra<sup>1</sup>,  
Subhas Chandra Panja<sup>2</sup>

<sup>1</sup>Department of Instrumentation Science, Jadavpur University, Kolkata

<sup>2</sup>Department of Mechanical Engineering, Jadavpur University, Kolkata

\*e-mail: [soumyaroy.burdwan@gmail.com](mailto:soumyaroy.burdwan@gmail.com), [sankarnarayan@isc.jdvu.ac.in](mailto:sankarnarayan@isc.jdvu.ac.in),  
[spanja@mech.jdvu.ac.in](mailto:spanja@mech.jdvu.ac.in)

## ABSTRACT

Solar Irradiance can contribute vital information about different Sun's internal dynamics as well as solar parameters like Sunspot Variation, Sun's Dimensions, Solar Chemical Processes etc. A Quasi Real Time Lossless Compression Algorithm based on the combination of Second Order Delta Modulation and Run Length Encoding (RLE) techniques for wireless monitoring of this astrophysical signal was described in this paper. In this novel algorithm, a "Data Frame" was tried to demonstrate with one original sample followed by 256 compressed characters. The elements organized by Second Order Delta Modulation from the 10 bit Quantized Direct Normal Solar Irradiance samples, are further compressed by Magnitude and Run Length Encoding Techniques. Magnitude Encoding might be materialized by either Nibble Combination or Byte Combination. The algorithm has been checked with 10 bit Quantized Sample of different Geographical Locations across India collected from National Renewable Energy Laboratory (NREL) with certain sampling rate. The typical value of Compression Rate (CR) and Root Mean Square Error (RMSE) with these sensors data are 3.36 and 0.82 respectively.

**Keywords:** *Quasi Real Time, Lossless, Data Compression, Data Transmission, Direct Normal Solar Irradiance*

For full paper ask the Author Or write to the Editor-in-Chief