

# Numerical Lattice Generalization of Complex Data Base in Space and Environmental Sciences

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Analysis of extended hybrid data base of high resolution measurements is becoming a tremendous methodological and computational task in all areas of natural science. The development of expert data base systems, especially in space science and geosciences, is the key to study complex scientific phenomena related to space and atmospheric/tropospheric environment dynamics. In this paper we introduce a mathematical generalization of multi-measurement systems based on the concept of numerical lattices. We define a generalized numerical lattice  $L$  as a function of four coefficients  $(p_1, p_2, p_3, p_4)$  that represents the following lattice properties: size, dimension, extension and coupling, respectively. From this generalization any multi data base can be reduced in a closed set of classified time series in  $N$  dimensions. We show, from application in data base from NASA and NOAA, that expert systems can be developed in order to make the real time analysis of these data systems a possible task. An example for space weather applications is given by constructing numerical lattice system for data from space plasmas (spatio-temporal solar data, interplanetary medium, magnetosphere, ionosphere) and earth atmospheric and oceanographic data.