

The application of neuro fuzzy model to the calculation of dynamo model

Shin-ichiro Kondo[1]

[1] Dept. of Materials Science and Eng., Nagasaki Univ

We predicted the currents in dynamo model(disk dynamo calculation) ,using neuro fuzzy model . In calculation the models which we adopt are as follows: 3 inputs/1 output, 5 inputs/ 1 output, 7 inputs/ 1 output and 18 inputs/1 output. After optimizing the system ,we examine the correlation for each model.

It is found that the neuro fuzzy model with many inputs such as 18 shows relatively poor agreement between predicted and observed values, which implies that embedding dimension is not so large as 18.

Pattern of geomagnetic field reversal is very complex,thus showing very strong non-linearity, Hence to predict the geomagnetic field reversal pattern,at first, we try to analyze the disk dynamo model with using neuro fuzzy model composed of self generating algorithm.

The number of data for study is about 100 and of total iteration is between 5000 and 10000. In calculation, the models which we adopt are as follows: 3 inputs/1 output, 5 inputs/ 1 output, 7 inputs/ 1 output and 18 inputs/1 output. After optimizing the system ,we estimate predicted values and examine the correlation for each model.

It is found that the neuro fuzzy model with many inputs such as 18 shows relatively poor agreement between predicted and observed values, which implies that embedding dimension is not so large as 18. However the model with too small inputs also shows poor agreement between predicted and observed values. Through the calculation, the model with 5 to 7 inputs shows relatively good agreement, thus indicating the range of embedding dimension is around these values.