

Summery of the Ohtsu Sensei's lecture

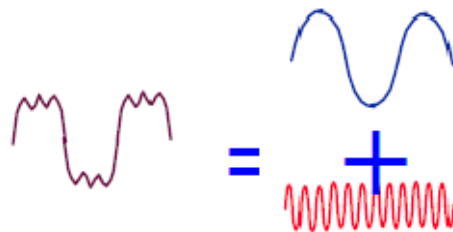
In real sea, the encountering wave heights as well as motions of ships are irregular in behavior as we find such irregular time history in page 1 of the given sheet. Moreover, we also find the irregularity in case of rudder response, yawing angle, heading angle and also in shaft revolution. So, some process must be developed to identify the behaviors of such patterns. For this purpose, we consider two important theories which are given below.

- 1) Time Series Theory
- 2) Frequency Domain Theory

In case of **Time series theory** we treat the irregular signals as the **stochastic process** and to identify and predict the behaviors of their states we used statistical theory. Using the time series, the sampling and the histogram consider a particulate sampling rate is given in page 6. Here we use the Guassian process. The scattering diagram which is actually a representation of plotted data of the time series considering Lag=0,1,2,3 are given in page 7. With the increase in Lag, the scatteredness also increases, where for Lag=0, we get a linear line.

In order to find out the relationship of plotted data in such scattered diagram **Correlation functions** are used with expression given in page 8 which are very important for forecast.

In case of **frequency domain** theory, any irregular shape can be represented by the summation of many sin or cosine curve having different frequency and time period. Using Fourier series expansion we can represent any irregular pattern except any random process. Such representation is given in page 12. For simplify we can also consider the following figure...



The explanation for the frequency domain theory is going on. So later we will know more about this.