

Review of Prof. Ohtsu's Lecture on 17.10.2010

The ship motion in actual sea is a time series with random process. Thus, it is important to understand and treat the irregular signals as *the stochastic process*. In terms of *time series theory* this stochastic process is modified to *statistical process*, so the behaviours of ship motion such as rolling, pitching, encounter wave height can be identified and predicted easily. In time series theory; histograms, scattering diagrams and correlation functions of time series are used to identify the behaviours of ship motion. For example, on page 9 of the given handout, some correlation functions of ship motion can be seen. For the encounter wave height, vertical acc. and pitching; it can be said that the damping coefficients are high. Also for the rolling motion, it is seen that this motion is a periodic motion and the period is rolling is 15 seconds. In terms of sampling of time series on page 9, a discrete signal can be obtained by sampling of continuous signals.

Moreover, the *fourier series expansion* and the method of calculating the fourier coefficients are mentioned. In terms of fourier expansion, a function can be written as an infinite series of sines and cosines. As an example, encounter wave height function can be obtained by sampling of sine and cosine functions on page 12.

Furthermore, it is mentioned that the *spectrum* can change the stochastic process into frequency domain. This subject will be considered later on according to the schedule.