of the auto spectrum and cross spectrum function in the conventional linear spectral analysis. The auto- and cross-trispectra are the FT of triple time correlations of two functions of time, the functions being identical in the case of auto-spectrum. The mathematical form of cross-bispectrum is shown in eq. below

$$B_{xxx}(f_1 f_2) = \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} Lt_{t\to\infty}\int_0^T y(t)x(t+\tau_1)x(t+\tau_2)dt$$

$$exp\{-2\pi(f_1\tau_1 + f_2\tau_2)\}d\tau_1 d\tau_2 \quad (11)$$

It is assumed that the hydrodynamic sources are non-linear and the signatures of these non-linear processes are measured in near field. NSTL has got a cavitation tunnel facility where these measurements can be carried out. Auto- and cross-bicoherence data obtained can be used to evaluate non-linear interaction in both time and spatial domain.

For a discrete, stationary, real valued, zero-mean process, the auto bispectrum is estimated as

$$\widehat{B}_{xxx}(f_1, f_2) = \frac{1}{M}\sum_{k=1}^{m} X_T^k(f_1 + f_2)X_T^{*(k)}f_2 \quad (12)$$

where $X_T^k(f)$ is the discrete FT of the k^{th} ensemble of the time series x(t) taken over time T, and M is the number of these ensembles.

The auto-bispectrum of a signal is a two-dimensional function of frequency and is generally complex-valued. In averaging over many ensembles, the magnitude of the auto-bispectrum will be determined by the presence of (or absence) of a phase relationship among sets of the frequency components at f_1, f_2 and $(f_1 + f_2)$.

If there is a random phase relationship among these three components, the auto-bispectrum will average to a very small value. If a phase relationship exists among these frequency components, the corresponding auto-bispectrum will have a large magnitude.

Because a quadratic non-linear interaction between two frequency components f_1 and f_2 yields a phase relationship between them and their summed component $f_1 + f_2$, the auto-bispectrum can be used to detect a quadratic coupling or interaction among different frequency components of a signal. The level of such coupling in a signal can