Appendix – A

Correlation function determination via expansion of fluctuations into the Fourier series

If the averaged value of T is found, we can calculate the related fluctuations: $T^{'}(x,y,z) = T(x,y,z) - \langle T \rangle$.

Let us expand the fluctuation into the Fourier series. We have

$$T^{'} = \sum_{\alpha}\sum_{\beta}\sum_{\gamma} f_{\alpha\beta\gamma} \exp(i\alpha x + i\beta y + i\gamma z) \quad \text{(A.1)}$$

$$\alpha = \pi n_x / L_x,$$
$$\beta = \pi n_y / L_y,$$
$$\gamma = \pi n_z / L_z.$$
$$n_x = -N_x,..,N_x,$$
$$n_y = -N_y,..,N_y,$$
$$n_z = -N_z,..,N_z$$

Here, N_x, N_y, and N_z are the chosen number of harmonics for each coordinate. L_x, L_y, and L_z are the maximum values of *x, y,* and *z.*

The correlation function $\langle T^{'}T^{'} \rangle$ takes the form

$$\langle T^{'}T^{'} \rangle\Big|_{x,y,z} =$$
$$= \left(\int_{-L_x}^{L_x}\int_{-L_y}^{L_y}\int_{-L_z}^{L_z} T^{'}(x_1 + x/2, y_1 + y/2, z_1 + z/2) T^{'}(x_1 - x/2, y_1 - y/2, z_1 - z/2) dx_1 dy_1 dz_1 \right) \times \quad \text{(A.3)}$$
$$\times \left(\frac{1}{2L_x} \frac{1}{2L_y} \frac{1}{2L_z} \right)$$

Another representation of (A.1) is as follows

$$T^{'} = \left(\frac{a_{0x}}{2} + \sum_{\alpha>0} \frac{a_{\alpha x} - ib_{\alpha x}}{2} \exp(i\alpha x) + \sum_{\alpha<0} \frac{a_{\alpha x} + ib_{\alpha x}}{2} \exp(-i\alpha x) \right) \times$$
$$\left(\frac{a_{0y}}{2} + \sum_{\beta>0} \frac{a_{\beta y} - ib_{\beta y}}{2} \exp(i\beta y) + \sum_{\beta<0} \frac{a_{\beta y} + ib_{\beta y}}{2} \exp(-i\beta y) \right) \times \qquad (A.4)$$
$$\times \left(\frac{a_{0z}}{2} + \sum_{\gamma>0} \frac{a_{\gamma z} - ib_{\gamma z}}{2} \exp(i\gamma z) + \sum_{\gamma<0} \frac{a_{\gamma z} + ib_{\gamma z}}{2} \exp(-i\gamma z) \right)$$

Expression (A.2) can be also written in such a form. In this case, (A.3) contains integrals having the form

$$\int \exp(i\alpha(x_1 - x/2)) \exp(i\overline{\alpha}(x_1 + x/2)) dx_1, \qquad (A.5)$$

$$\int \exp(i\alpha(x_1 - x/2)) \exp(-i\overline{\alpha}(x_1 + x/2)) dx_1, \qquad (A.6)$$

$$\int \exp(-i\alpha(x_1 - x/2)) \exp(i\overline{\alpha}(x_1 + x/2)) dx_1, \qquad (A.7)$$

$$\int \exp(-i\alpha(x_1 - x/2)) * \exp(-i\overline{\alpha}(x_1 + x/2)) dx_1, \qquad (A.8)$$

$$\int \exp(i\alpha(x_1 - x/2)) dx_1. \qquad (A.9)$$

Integrals of type (A.5), (A.8), and (A.9) are zero. This is also the case for integrating over y and z. Integrals (A.6) and (A.7) equal 1 at $\alpha = \overline{\alpha}$ and 0 for other cases.

This means that the expression for correlation function $\langle T^{'} T^{'} \rangle$ has the form

$$\langle T^{'} T^{'} \rangle = \sum_{\alpha} \sum_{\beta} \sum_{\gamma} f_{\alpha\beta\gamma} \, \varphi^{*}_{\alpha\beta\gamma} \, \exp(i\alpha x + i\beta y + i\gamma z), \qquad (A.10)$$

Where $\varphi^{*}{}_{\alpha\beta\gamma}$ is the complex conjunction to the coefficient $\varphi_{\alpha\beta\gamma}$.

Any correlation function can be found by formula similar to (A.10).