CHAPTER OVERVIEW

4: Time Correlation Functions

In the last chapter, we explored the low-frequency, long-wavelength behavior of a system that is disturbed from equilibrium. In the first section of this chapter, we study the opposite limit, and describe how a system behaves at very short times and high frequencies. The study of systems in this limit is referred to as Molecular dynamics.

We are ultimately interested in developing a set of expressions that describe a system at all times and frequencies. In section 2, we will introduce the projection operator and use it to derive the Generalized Langevin Equation. The projection operator allows us to study only the portion of the system we are interested in, and treat the rest as a statistical bath. In section 3, we will use the GLE to derive the viscoelastic model for transverse current. Finally, in section 4, we will introduce mode-coupling theory and discuss its ability to predict long-time tails in velocity correlation functions.

For further information on the subjects covered in this chapter, please consult books by Hansen and McDonald[1], McQuarrie[2], Boon and Yip[3], and Berne [4].
