

We present theoretical methods for studying quantum mechanical systems subjected to fast periodic driving and apply them to model systems with long-range interaction. We provide a comparison between the methods and insight facilitated by these methods. The methods recently occurred in scientific papers, which supports the need for a scrutinized exposition of the theory. One of the main objects of the theory is a so-called Floquet Hamiltonian—an artificial stationary Hamiltonian describing important features of a quantum system. The methods construct Floquet Hamiltonians in the form of series in the powers of the time period. We present the spectra of Floquet Hamiltonians—the so-called quasienergy spectra—computed by the methods and computed numerically (with higher precision). The quasienergy spectra were computed using various approximations of Floquet Hamiltonians and compared. We discuss an interesting topic of the classical limit of an artificial stationary system. We also mention the kicked rotor system and its connection with the kicked top system—one of our model systems. In summary, the method characterized by simultaneous construction of a Floquet Hamiltonian and a so-called kick operator (operator capturing fast changes of the system) was found universal and accurate. The thesis presents an elaborated theoretical background for future study of the systems in more specific areas of physics and manifests the strengths and weaknesses of the methods.