Abstract: This thesis deals with the theory of non-linear spectroscopy and effects of coherent quantum dynamics in non-linear spectroscopy. It provides a short review of spectroscopic methods with an emphasis on the pump-probe technique. Studying general process of N-wave mixing experiment, we develop a theory of non-linear response and in terms of Liouville pathways we derive the mathematical expression for 3rd order response function. We present examples of manifestations of coherent effects in 2D and pump-probe spectra and their comparison. Special attention is paid to relaxation and exciton coherence between two excited electronic states of a molecular dimer.