The dynamics associated with phase transitions giving rise to incommensurately modulated structures have recently been found in numerous ferroelectric and related crystals. General survey is given of the recent results obtained by the author and others, especially in Japan, on those crystals, such as K$_2$SeO$_4$, (NH$_4$)$_2$SeO$_4$, Li$_2$ZnBr$_4$, (NH$_4$)$_2$CuCl$_4$, ZnCl$_2$, [N(CH$_3$)$_4$]$_2$OCl$_2$, Rb$_2$(GeO$_4$)$_2$, etc. The wave vector $q_1$ characterizing an incommensurate structure is related to a commensurate structure characterized by $q_0$ with $\delta$ indicating the deviation: $q_1 = q_0 + \delta$. According to the Lifshitz condition is satisfied or not at $q_0$, the incommensurate structures are classified into Lifshitz and non-Lifshitz types (Iizumi and Gesi, J. Phys. Soc. Jpn. (1980) 49, Suppl. B, 72). The distinction corresponds to whether an incommensurate structure is allowed by the symmetry of crystal or not. A substantial distinction has been observed in the magnitudes of $\delta$: they are small in the Lifshitz type ferroelectrics, no matter which values $q_0$ takes among 1/3, 2/5 and 1/2 in the reduced unit, whereas $\delta$ has substantial values for the non-Lifshitz type incommensurate structures. Various kinds of temperature change of $\delta$ have been observed within the incommensurate phases with a unique result that the incommensurate-to-commensurate phase transitions are always of the first order. The successive phase transitions from the normal to incommensurate and then from the latter to the commensurate phases and the appearance of the secondary lattice distortion, e.g. spontaneous polarization in ferroelectric, commensurate phases, have been understood by the Landau-type theory by taking into account higher order terms with a proper order in the free energy expansion.

In many crystals the wavevector of the modulated phase changes with temperature, and is continuously related to a commensurate wavevector at low temperature. The lock-in transition can be described as an instability of the low temperature phase against domain walls in the phase modulations. Theoretically the diffraction pattern for these domain walls should consist of many Fourier components but experimentally these are not usually observed. Possible reasons for this and other discrepancies between theory and experiment at these transitions will be discussed.