

This thesis is devoted to the theoretical study of slow thermodynamic processes in non-equilibrium stochastic systems. Its main result is a physically and mathematically consistent construction of relevant thermodynamic quantities in the quasistatic limit for a large class of non-equilibrium models. As an application of general methods a natural non-equilibrium generalization of heat capacity is introduced and its properties are analyzed in detail, including an anomalous far-from-equilibrium behavior. The developed methods are further applied to the related problem of time-scale separation where they enable to describe the effective dynamics of both slow and fast degrees of freedom in a more precise way.