The thesis studies theories of dimensional reduction on the example of the Kac-Zwanzig (heat bath) model. The studied methods are the Mori-Zwanzig projection formalism and the lack-of-fit reduction, both applied for two sets of resolved variables. The methods give integro-differential and ordinary differential evolution equations respectively. For the Mori-Zwanzig formalism, a limit of the number of particles going to infinity is made, which leads to an exponential memory kernel and consequently to a set of stochastic differential equations. The evolution equations of the two methods are compared using numerical simulations.