

# The Inertial Mass and Collective Path in Nuclear Fusion/Fission Reactions

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Abstract:

On the basis of the adiabatic self-consistent collective coordinate (ASCC) method, we extract a collective motion path from the large dimensional space of Slater determinants for the large amplitude nuclear collective motion. The optimal form of the collective coordinate which is decoupled from other intrinsic degrees of freedom is obtained microscopically. We apply this method to the fusion reaction systems of  $^{12}\text{C} + \alpha$ ,  $^{16}\text{O} + \alpha$ ,  $^{16}\text{O} + ^{16}\text{O}$ . We found the self-consistent collective coordinate can be very different from the deformation parameter which is usually assumed to be the collective coordinate. The inertial mass parameters for the relative motion are calculated.