Total and Partial Capture Cross Sections in the Reactions with Deformed Nuclei at Energies Near and Below the Coulomb Barrier

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The quantum diffusion approach is applied to study the capture process in ^{16}O + ^{112}Cd, ^{152}Sm, ^{184}W, ^{28}Si + ^{100}Mo, ^{40}Ca + ^{96}Zr, ^{48}Ca + ^{90}Zr, and ^{64}Ni + ^{58,64}Ni, ^{100}Mo reactions with deformed nuclei at above- and sub-barrier energies. Total and partial capture cross sections and mean angular momenta of the captured systems are calculated. The available experimental data at energies above and below the Coulomb barrier are well described. As shown, the experimentally observed sub-barrier fusion enhancement and corresponding change of angular momentum in these reactions are mainly related to the direct or indirect (after two neutron transfer) effect of quadrupole deformation of the colliding nuclei. For the reaction ^{64}Ni + ^{100}Mo taking into account the effect of two-neutron transfer with positive Q_{2n}-value weakly influences on the total and partial capture cross sections. This is due to the fact that the transfer process almost does not change the Coulomb barrier. In the reaction ^{58}Ni + ^{64}Ni two-neutron transfer ($Q_{2n} > 0$) leads to an increase in the light nucleus deformation and, correspondingly, to a decrease in the Coulomb barrier height, which enhances the capture and increases the width of the partial distribution. In the ^{28}Si + ^{100}Mo reaction the contrary behavior is observed.