Cluster Approach to the Structure of Heavy Nuclei

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A possible unified approach to the theoretical evaluation of the collective part of the spectra of heavy nuclei is offered by the dinuclear system model, which treats the wave function of the nucleus as a superposition of mononucleus and two-cluster configurations in a dynamical way that permits exchange of upper-shell nucleons between the clusters. The observed excitation spectra, angular momentum dependences of the parity splitting and of the transitional multipole moments are well described in many even-even and odd-mass isotopes of actinides and medium-mass nuclei [1].

We extend the model to calculate the collective spectra of actinides along the fission barrier and at scission. The obtained spectra are used for evaluation of the neutron-induced fission cross sections. With an improved version of the scission-point model [2], angular distributions of fission fragments are analyzed for some U and Pu isotopes of interest to nuclear energy applications.

References

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