Systematic study on fission yields, fission nuclear data and fission mechanisms (6) Analysis of TKE by 3D Langevin equation

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Total kinetic energies (TKEs) of fission fragments at several excitation energies have been calculated using 3D Langevin process with microscopic transport coefficients and compared with experimental data obtained by incident neutrons. The correlation of mass yield and TKE are also shown for several selected energies of interest.

Keywords: Total kinetic energy, Langevin equation, Nuclear fission, Fission fragments.

1. Introduction

We compare the TKE from our 3D Langevin calculation using local microscopic transport coefficient as was described in Ref [1] for excitation energy up to 50 MeV and compare them with the corresponding incident neutron experimental data.

2. Computation and Methodology

Some of the observables given by includes prescission kinetic energy, fission fragments charge and mass of each fragment. From the charge of the fragments, we calculate the kinetic energy due to Coulomb repulsion. The sum of prescission and Coulomb repulsion kinetic energy will give us the TKE.

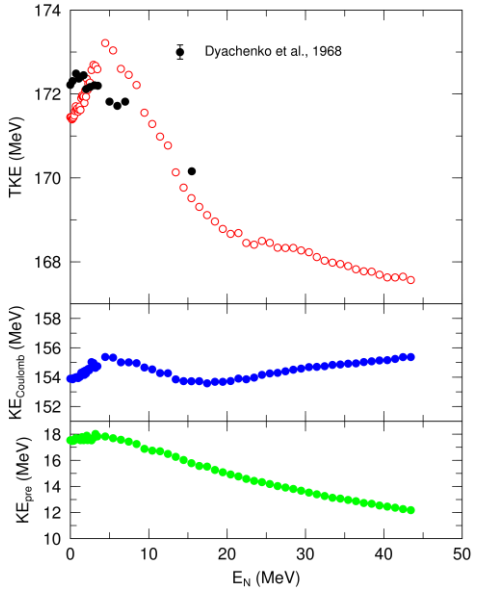

Figure 1 Excitation energy dependence of U-236

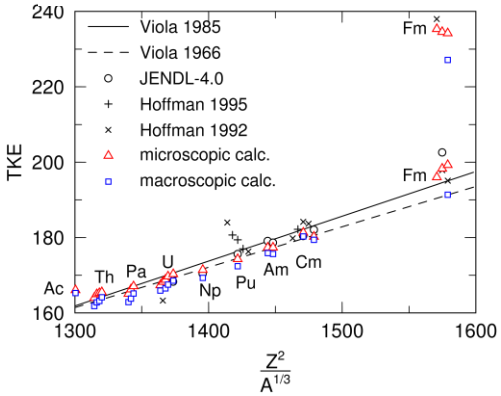

Figure 2 TKE systematics as a function of Coulomb repulsion.

3. Preliminary Results and Conclusion

We show preliminary results for ^{236}U in fig.1 and compare it with data from [2]. Prescission kinetic energy seems to decrease, while kinetic energy from Coulomb repulsion increase as excitation energy gets higher. TKE also decreases point to the higher rate of prescission kinetic energy decreases. The effects of Coulomb repulsion on the TKE however demonstrates a huge role if we observe the TKE systematics of nuclei with increasing charge as in fig.2. Special attention to our result for ^{254,256,258}Fm as it reveals that it reveals the role of Coulomb repulsion in the transition from twin peak to single peak mass distribution of fission fragments.

References

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