ENERGY SURFACE AROUND A DEFORMED EVEN-EVEN NUCLEI WITH 150<A<190

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If an ideal energy surface around a deformed nucleus with even N and Z existed and were linear and quadratic in deviations s and t from N and Z respectively $(|s|/N \ll 1, |t|/Z \ll 1)$

$$E(N+s,Z+t) = M(N+s,Z+t) - m_n(N+s) - m_p(Z+t) = \mathscr{E}(N,Z) + d_{1n}s + d_{1p}t + \\ + d_{2n}s^2/2 + d_{2p}t^2/2 + d_{1n1p}st$$

(E, M are nuclear energy and mass, m_n, m_p are nucleon masses), then parameters $\mathscr{E}(N,Z)$ and d_{inkp} should not depend on those adjacent nuclei which are used for calculations of these parameters. In particular, a measured $E(N,Z)$ has to coincide with a calculated parameter $\mathscr{E}(N,Z)$. For determination of $E(N,Z) - \mathscr{E}(N,Z)$ and other parameters three groups of even-even nuclei are applied: s -Appr. (Approximation, $s = \pm 2, \pm 4, t = 0$, i. e. isotopes); t -Appr. ($s = 0$, $t = \pm 2, \pm 4$, i.e. isotones) and $(st)-$ Appr. in which $s = \pm 2, t = \mp 2; s = \pm 4, t = \mp 4$

Calculated quantities $E(N,Z) - \mathscr{E}(N,Z)$ are given in Table [1], which shows that these quantities are sign variable in different approximations and a maximum divergence attains $\simeq 120\text{keV}$. Approximately the same difference is found in other parameters. Thus, description of the energy surface around a deformed even-even nucleus by Eq. (1) is rather approximate. This information is useful for prediction of unknown masses and calculations of the pairing energies.

Nucleus	$E(N,Z) - \delta$(N, Z)		
	s -Appr.	t -Appr.	(st) -Appr.
$^{154}_{64}$ Gd$_{90}$	128.6± 2.0	-8.9± 19.2	121.8± 10.3
$^{160}_{66}$Dy$_{94}$	-29.6± 8.6	-53.1± 9.2	-68.2± 18.4
$^{70}_{170}$ Yb$_{100}$	37.7± 1.4	29.9± 16.9	-8.8± 33.9
$^{180}_{74}$W$_{106}$	74.6± 13.6	77.6± 11.3	-55± 61
$^{188}_{76}$ Os$_{112}$	-21.0± 1.1	-179.0± 7.2	12.4± 9.7

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References:

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