

**Table 2 Comparison of observed and calculated gravitational harmonics (un-normalized; reference radius 60330 km).**

Where two values are given they denote the minimum and maximum values from the suite of models. The physical models in column 3 match the observed  $J_2$  and  $J_4$  in Table 1, over a parameter space considering ranges of  $S_{\text{eq}}$ ,  $Y_{\text{eq}}$ ,  $Z_{\text{eq}}$ ,  $r_i$  and rotation periods from 10h32m44s to 10h47m06s. For the same span of rotation periods, column 4 reports a wider range from models that match only  $J_2$  and allow for density modifications assuming  $r_i = 0.2$ . For  $J_2$ - $J_4$ , the discrepancy between measurements and uniform rotation models is large for all models that assume uniform rotation. Column 5 shows a representative model with DR on cylinders and a deep rotation period of 10h39m22s that matches measurements from  $J_2$  to  $J_4$ .

Measurements	Physical models with uniform rotation		Uniform rotation model with modified density profiles		Physical model with differential rotation
$16290.573 \pm 0.028$	16290.57		16290.57		16290.573
$-935.314 \pm 0.037$	-935.31		-990.12	-902.93	-935.312
$86.340 \pm 0.087$	80.74	81.76	75.69	90.42	86.343
$-14.624 \pm 0.205$	-8.96	-8.70	-10.26	-7.97	-14.616
$4.672 \pm 0.420$	1.08	1.13	0.97	1.33	4.677