SPIN VECTORS OF ASTEROIDS 21 LUTETIA, 196 PHILOMELA,
250 BETTINA, 337 DEVOSA AND 804 HISPANIA

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INTRODUCTION

Such parameters as shape, orientation of spin axis, prograde or retrograde rotation
are important for understanding the collisional evolution of asteroids since the primordial
epochs of solar system history. These parameters remain unknown for most asteroids and
poorly constrained for all but a few. In this work I present results for five asteroids: 21,
196, 250, 337, and 804.

I have used epochs of lightcurve maxima, amplitudes and absolute magnitudes of the
maxima. The method of calculation is described in Michałowski 1988, 1991 and
Michałowski and Velichko 1990. This method allows me to obtain senses of rotation, sidereal periods,
poles, and axial ratios of the ellipsoids which describe the shapes of asteroids.

RESULTS

Most of the lightcurves I have used were taken from the Asteroid Photometric Catalogue (hereafter APC) – Lagerkvist et al. 1987, 1988. Results of the calculations are presented in Table 1. When results by other authors exist, they are given in Table 1 for comparison.

21 Lutetia

Six lightcurves from the 1962, 1981, 1983 and 1985 oppositions are used in the analysis.
All of them are taken from APC. My sidereal period is shorter then the one by Lupishko
and Velichko 1987. From a comparison between their results and results of independent
determinations for a few additional asteroids (cf Magnusson 1989) I conclude that their
method of determining the sidereal periods does not work very well.

196 Philomela

I can use only three lightcurves from the 1964, 1981 and 1989 oppositions (APC and
Erikson et al. 1991). This maybe the cause of my inability to determine the sidereal
period and sense of rotation. There are a few sets of synodic cycles which give different
$P_{sid}$ for both prograde and retrograde rotation. I think the next observation will allow me
to calculate these values. There are no previous results for this asteroid.
Table 1. Results

<table>
<thead>
<tr>
<th>Pole Axial ratios</th>
<th>Sidereal period(days)</th>
<th>Sense of rot.</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \lambda_p )</td>
<td>( \beta_p )</td>
<td>( \frac{b}{a} )</td>
<td>( \frac{c}{a} )</td>
</tr>
<tr>
<td>55±8</td>
<td>+44±5</td>
<td>1.32±0.04</td>
<td>2.01±0.28</td>
</tr>
<tr>
<td>241±9</td>
<td>+40±8</td>
<td>1.28±0.05</td>
<td>1.36±0.30</td>
</tr>
<tr>
<td>42</td>
<td>+40</td>
<td>1.25</td>
<td>1.09</td>
</tr>
<tr>
<td>223</td>
<td>+48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

196 Philomela

<table>
<thead>
<tr>
<th>Pole Axial ratios</th>
<th>Sidereal period(days)</th>
<th>Sense of rot.</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>78±15</td>
<td>26±12</td>
<td>1.57±0.04</td>
<td>1.05±0.05</td>
</tr>
<tr>
<td>266±15</td>
<td>24±12</td>
<td>1.59±0.04</td>
<td>1.06±0.05</td>
</tr>
</tbody>
</table>

250 Bettina

<table>
<thead>
<tr>
<th>Pole Axial ratios</th>
<th>Sidereal period(days)</th>
<th>Sense of rot.</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>85±9</td>
<td>-9±7</td>
<td>1.33±0.05</td>
<td>1.70±0.09</td>
</tr>
<tr>
<td>260±12</td>
<td>-35±10</td>
<td>1.33±0.07</td>
<td>1.61±0.10</td>
</tr>
<tr>
<td>104</td>
<td>-16</td>
<td>1.318</td>
<td>1.375</td>
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</tbody>
</table>

337 Devosa

<table>
<thead>
<tr>
<th>Pole Axial ratios</th>
<th>Sidereal period(days)</th>
<th>Sense of rot.</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>199±7</td>
<td>-51±8</td>
<td>1.24±0.04</td>
<td>1.34±0.07</td>
</tr>
</tbody>
</table>

804 Hispania

<table>
<thead>
<tr>
<th>Pole Axial ratios</th>
<th>Sidereal period(days)</th>
<th>Sense of rot.</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>90±12</td>
<td>28±10</td>
<td>1.17±0.05</td>
<td>1.92±0.15</td>
</tr>
</tbody>
</table>

Sense of rotation: P-prograde, R-retrograde


250 Bettina

337 Devosa

I have used ten lightcurves from the 1977, 1983, 1984-85, 1986, 1987 and 1988 oppositions (APC and Weidenschilling et al. 1990), obtaining one solution only. There are no previous results for this asteroid.

804 Hispania

There are six lightcurves from the 1979, 1982 and 1987 oppositions. I have been able to use only three epochs of the primary maxima and probably this is the reason of my inability to obtain the sidereal period and sense of rotation. New observations are required.

Acknowledgements.

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REFERENCES


