VELOCITY VARIATION OF LEADER SUNSPOTS WITHIN THE SOLAR CYCLE

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Richardson and Schwarzschild, from an investigation of 400 long-lived sunspots, found no significant differences in the indicated rate of solar rotation throughout the 22-year magnetic cycle.[1] To provide further information on this question, especially with regard to the variation with latitude of the rotation throughout the cycle, we have derived the rotation rates indicated by leader spots selected from 1621 sunspot groups during the years 1917–25 (Mount Wilson groups Nos. 512–2132[2]).

The period of the survey reached from the maximum of one cycle through the minimum and half-way to the maximum of the following cycle. A total of 365 leader spots was chosen; the magnetism of all spots chosen was proper for a leader spot in the part of the cycle and hemisphere in which the spot occurred. Thus, only leader spots marked *R* (of north magnetic polarity) were chosen in the northern hemisphere for 1917, etc.

No more than one spot was ever chosen from a group, and no spot was followed that did not have a penumbra. There was no chance of losing track of a chosen spot between observations. Generally, only those spots were chosen that were sharply localized by the Mount Wilson observers with two arrows and corresponding coordinates. As far as possible, the motion of a spot was averaged over an interval of from 5 to 12 days. For only 14 spots was the motion averaged over as little as 3 days. Observations were not accepted beyond 80° east or west longitude, and only five observations beyond 75° east or west longitude were utilized. The rates obtained lay between 0°.52 and 0°.61 per hour.

The time was divided into six intervals, and the angular spot velocities for each interval were plotted as a function of latitude. The material showed a large scatter, but linear regression lines, showing the variation of velocity with latitude, were obtained in each case by the method of least squares. The slopes of these lines indicate, within the limits of their rather large errors, the mean rate of change of angular rotational velocity with latitude for each

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