

AN AUTOMATIC OPTICAL PERIODOGRAPH

by A. E. Douglass

(Abstract)

This instrument is designed for the rapid preliminary analysis of series of observations such as rainfall, temperature, variable stars, etc., into periodic and non-periodic elements. Light is passed thru between the plotted curve and some datum line; thence thru a cylindrical lens with vertical axis. In the focal plane the curve-crests appear in light intensity. The vertical lines in the focus pass thru an analyzing plate consisting of narrow, equally spaced parallel transparent lines, tipped at a slight angle from the vertical. Interference fringes are produced which indicate the periods sought. A photograph of the interference or differential pattern so produced is used in detailed study. Condensing lenses are inserted back of the analyzing plate to carry the light thru an integrating cylindrical lens with horizontal axis which reproduces on a vertical slit at the back the summation of horizontal fringes. Back of the slit is a long photographic film mounted on the outside of a drum which rotates as the periodograph moves along its track. The track extends in a direction perpendicular to the plane of the curve in order that the size of the image in the focal plane may change thru a considerable range. The instrument is moved along the track by an electric motor and has automatic focussing and signal devices attached. The image produced on the film is the periodogram. Periods are indicated in it by a beaded or corrugated effect.

This periodograph is especially adapted to the study of cycles and

has been used in investigating weather variations and periodic variations in tree growth. It has been tested in the solution of variable star periods. Preliminary forms of parts of it has been described in the Astrophysical Journal, October, 1914, and April, 1915.

University of Arizona