Conic constant

In geometry, the **conic constant** (or **Schwarzschild constant**, after Karl Schwarzschild) is a quantity describing conic sections, and is represented by the letter K. For negative K it is given by

$$K = -e^2,$$

where e is the eccentricity of the conic section.

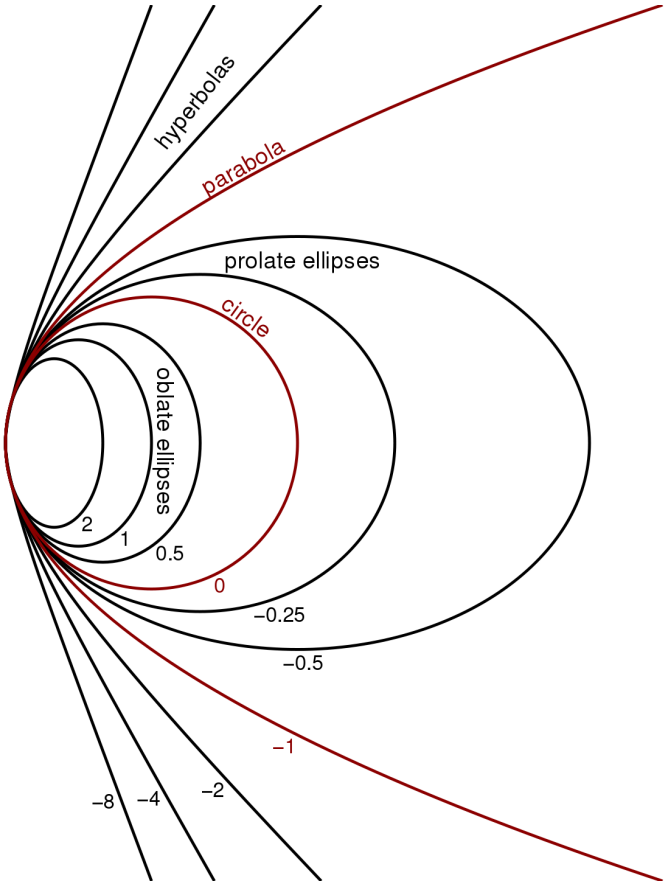
The equation for a conic section with apex at the origin and tangent to the y axis is

$$y^2 - 2Rx + (K+1)x^2 = 0$$

where K is the conic constant and R is the radius of curvature at $x = 0$.

This formulation is used in geometric optics to specify oblate elliptical ($K > 0$), spherical ($K = 0$), prolate elliptical ($0 > K > -1$), parabolic ($K = -1$), and hyperbolic ($K < -1$) lens and mirror surfaces. When the paraxial approximation is valid, the optical surface can be treated as a spherical surface with the same radius.

Some non-optical design references use the letter p as the conic constant. In these cases, $p = K + 1$.



An illustration of various conic constants

References

- Smith, Warren J. (2008). *Modern Optical Engineering, 4th ed.* McGraw-Hill Professional. pp. 513–515. ISBN 978-0-07-147687-4.

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