

Applications to the Witch

The witch of Agnesi, a curve, has applications to real-life phenomenon, which has only come about fairly recently. The equation below where $h=2a$,

$$y = \frac{h}{1+(x/a)^2} = \frac{ha^2}{a^2 + x^2}$$

has importance with physicists. The equation approximates the spectral line distribution of optical lines and x-rays as well as the amount of power that is dissipated in resonant circuits. One exception to the rule is the Doppler Effect, which is represented on Gauss error curve. H.E. White has discovered several effects that cause the distribution that has the shape of the curve. These may include: collision damping and the Stark Effect broadening, classical electromagnetic theory of line widths, and quantum-mechanical theory of line widths. Derivatives of the Witch of Agnesi have been expanded in the polynomial form better suited in correcting for use in a method derived by Roy C. Spencer at Brace Laboratory of Physics at the University of Nebraska at Lincoln, Nebraska. The points on the witch whose ordinates are $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ of the maximum have special properties that have use in the above.