

# The effects of axial forces to an arch subjected to uniform radial loads

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**Abstract.** The effects of axial forces to an arch subjected to uniform radial loads are investigated. The clamped arches are more sensitive to axial forces than the hinged arches, and the curvature curves of an edge of the clamped arches undergoing a large axial forces fluctuate to the change of normal pressure. The balance of elemental length is used to derive a nonlinear equilibrium equation. The governing equation is solved numerically using the shooting method based on the fourth order Runge-Kutta.

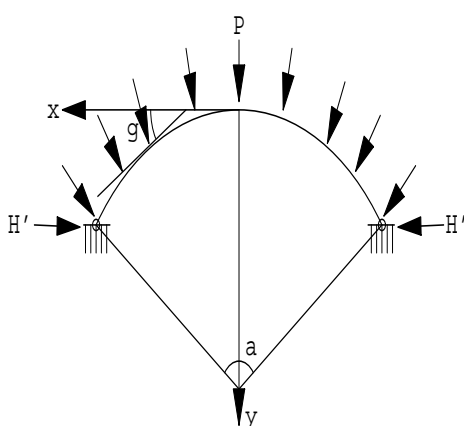


Figure 1. Radial and axial loads.

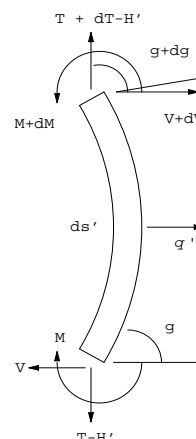


Figure 2. An elemental length ( $V = S + H' \frac{dy}{dx}$ ).

## Governing Equation:

$$g_{ssss}g_s - g_{sss}g_{ss} - q_n g_{ss} + g_{ss}g_s^3 - 2Hg_s^3 \sec^2 g \tan g + H_s g_s^2 - H_s g_s^2 \sec^2 g = 0.$$

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