To maintain a constant stress, the following condition must be satisfied:

(1)

Where:

= initial specimen length

= initial value of r (instantaneous moment arm of the applied weight)

The instantaneous specimen length can be written as:

*L =* + (2)

Where:

= angle for initial positioning of constant-stress cam

Eliminating *L* from equations (1) and (2) gives you the equation for the profile of a constant-stress cam:

(3)

This equation needs to be transformed into fixed a Cartesian coordinate system for ease of use in terms of *x* and *y*.

(4)

(5)

(6)

Eliminating x and y from the equations:

Substituting the above equation and equation (3) into equations (4) and (5) yields the fixed coordinates of the constant-stress cam in terms of the single parameter :

Where: