

## Cusack's Universal Bridge

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### Abstract

Here is the Structural Analysis of a bridge design that models the physical universe parameters found in Astrotheology.

**Keywords:** Cusack's bridge; Cantilever; Spring; 3 Hinged arch

### Introduction

Every Civil Engineer should have a chance to design a bridge. So, here I design what I term the Cusack Universal Bridge. It models the physical universe and all its parameters. We begin with the spring (Figure 1).

### Spring

$$F = -ks$$

$$26.667 = 0.4233(s)$$

$$s = 6.3$$

$$s/2 = 3.15 \sim \pi$$

We continued with static equilibrium and the sum of the forces and moments equalling zero.

### Static Equilibrium

$$\sum M_a = M_a - M_b - (1)(F_d) = 0$$

$$\sum M_b = M_b + M_a + F_d(6.67) + F_e - V_a(19.45) = 0$$

$$\sum M_c = 0 - V_a(25.1) - F_b(1/2)(5.465) - F_d(0.866)(7.67) - V_e(1) = 0$$

$$\sum M_d = -V_a(25.1) - F_b(1/2)(5.465) - F_d(0.866)(5.465) - V_e(1) = 0$$

$$\sum F_x = F_a - F_e - F_b(0.866) - F_d(1/2) = 0$$

$$\sum F_y = -26.667 + V_a + F_b(1/2) + F_d(0.866) = 0$$

And continuing,

### Dampened Cosine Curve

The Dampened cosine function for a spring,

$$Y = e^{-t} \cos \theta =$$

$$\text{Work} = F \cdot d$$

$$6.3 (26.667)$$

$$\text{Let } \theta = \sin 45^\circ = \cos 45^\circ$$

$$Y = 1 = s = x \text{ in our spring.}$$

Finally, the basic cantilever:

$$M_a = (25.1) \cdot (26.667) = 669.4.$$

### Results

When we solve this system of equations we get:

$$M_a = 75.33 \quad 1/s$$

$$M_b = 81.69 \quad 1/M$$

$$F_a = 0 \quad \text{time}$$

$$V_a = 15.39 = 1/\sin 1 \quad 1/\text{Force}$$

$$F_b = 390 \quad 1/\text{Period } T = 1/E$$

$$F_d = 6.56 \quad \text{Gravitational Constant} = G \text{ less Nuclear}$$

$$V_d = 13.334 \quad \text{space} = s$$

$$V_e = 14.95 \quad \text{Mass Gap}$$

$$F_e = 34 = 1/c$$

$$k = 0.4233 = \text{cuz}$$

$$L = 251 = T$$

$$G = 6.67 = G$$

$$a = v = \sin 45 = P = F$$

So all of the Universal parameters are contained here.

$s, G, k, F, t, x = s, Y = G.M., a = v = \sin 45 \text{deg.}, dM/dt, \delta, \text{freq}, c^2$  (Figures 2 and 3).

### Conclusion

Thus we see that a 3 point arch bridge can be used to model the physical universe and its 12 parameters [1].

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CUSACK'S BRIDGE

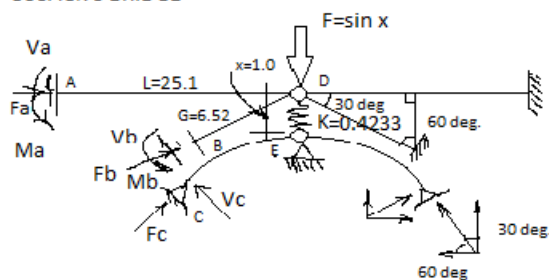
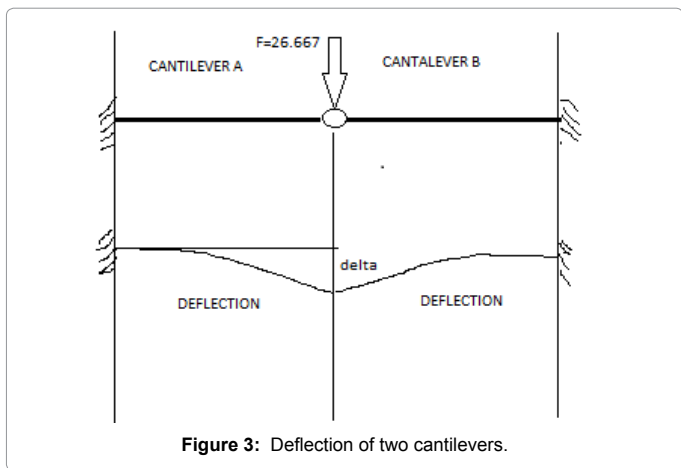
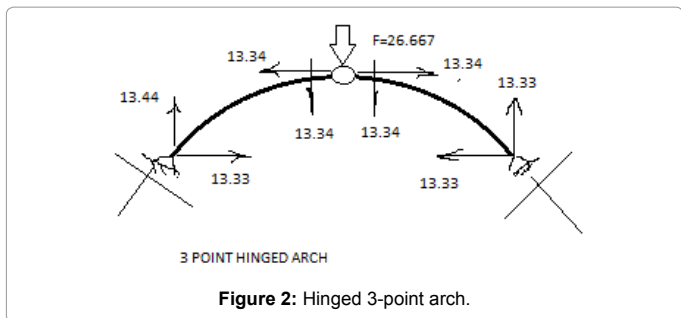


Figure 1: The structural model of the Cusack' universal bridge.



**References**

1. Cusack P (2016) Astro-Theology, Cusacks Universe. J Phys Math 7: 174.

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