

How strong is Spaghetti Bridge?

Rafał Chałupnik

Zespół Licealno-Gimnazjalny w Długolece, Grupa Twórcza Quark

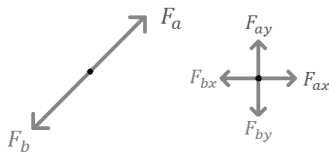
1. Introduction

A lot of architects use spaghetti bridges as models to test their resistance on forces. But how strong the model really is? What kind of forces are affecting?

2. Theoretical part

My model must fulfill few restrictions: maximum length must be within 70 centimeters, load plate's dimensions are 10 x 5 centimeters, singular glue point radius must be within 1 centimeter and maximum depth must be less than 30 centimeters.

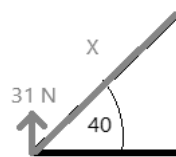
The forces affecting on construction must balance each other, as it is said in first Newton's law. So the sum of X components of forces and Y components must equal zero.



$$\sum (F_{ax} + F_{bx}) = 0$$

$$\sum (F_{ay} + F_{by}) = 0$$

Lastly, I had to calculate the force affecting on each span in bridge. I used trygonometry and reaction forces to create proportional diagram of bridge.



3. Experimental part

I had to decide how to construct my bridge. What type of span is most effective in each force type (compression, tension, shear), create the model and make research for spans resistance.

4. Conclusion

After calculating theoretical maximum load and building whole construction, I compared two results. Results are nearly equal – that means that this method of calculating is effective.