

## DP Graph Experimentation

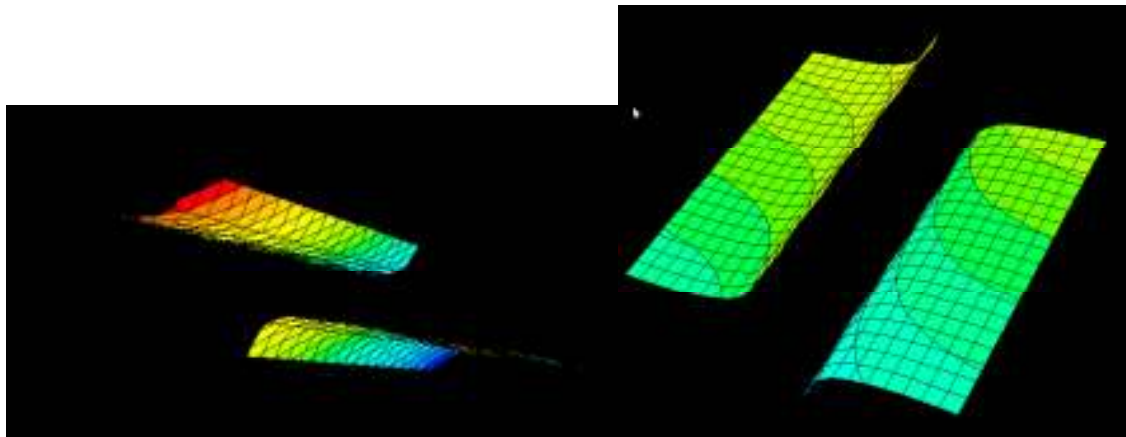
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I wanted to see how changing exponents in the equation would change the image I got back.

The first thing I did was change the equation from “ $\text{graph3d}(a*x^2+b*y^2*\sin(c*time)=d*z^2)$ ” to “ $\text{graph3d}(a*x^1+b*y^1*\sin(c*time)=d*z^1)$ ”. The shape I got was a plane, which made sense. I just learned about planes in Calculus III today.

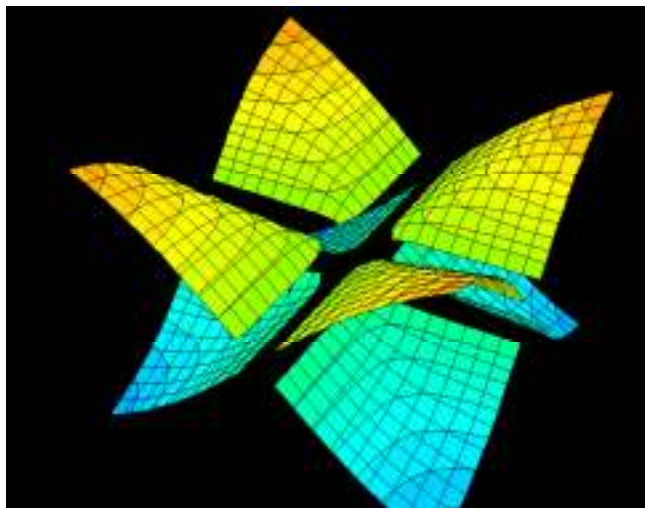
Next I wanted to know what would happen if I make one or more of the exponents negative.



I got two slightly curved sheets when I made the x exponent -1.

In class I had been making all the exponents larger, which gave me large, elaborate shapes. If I did the same but put a negative sign in front of the exponent, would it have a similar effect?

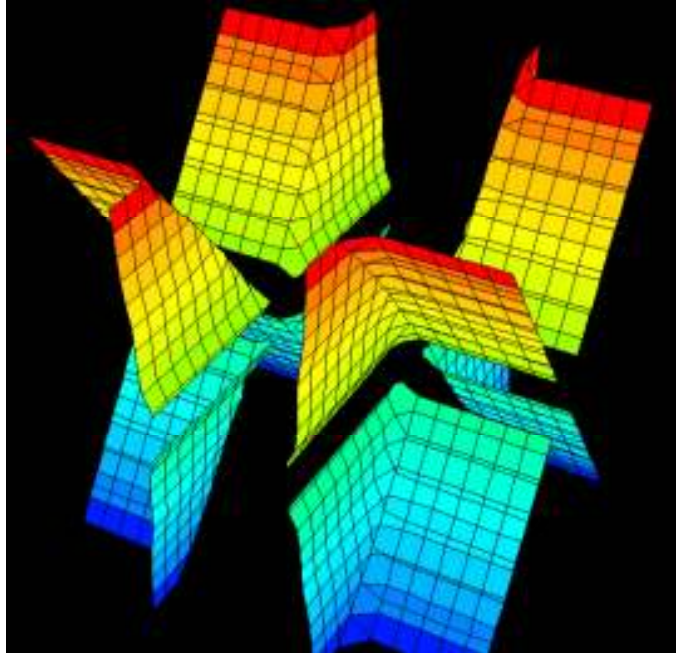
I changed the equation to “ $\text{graph3d}(a*x^{-2}+b*y^{-2}*\sin(c*time)=d*z^{-2})$ ”.



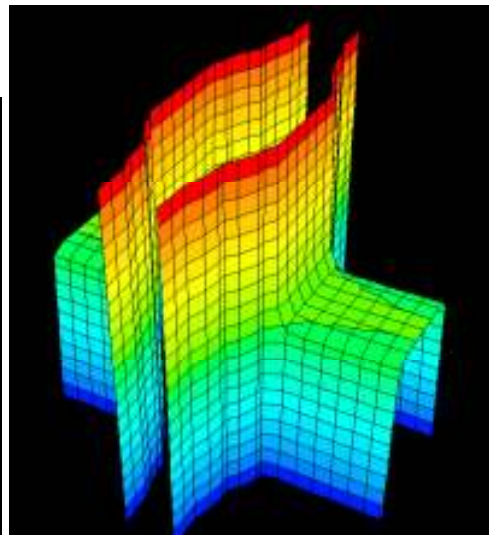
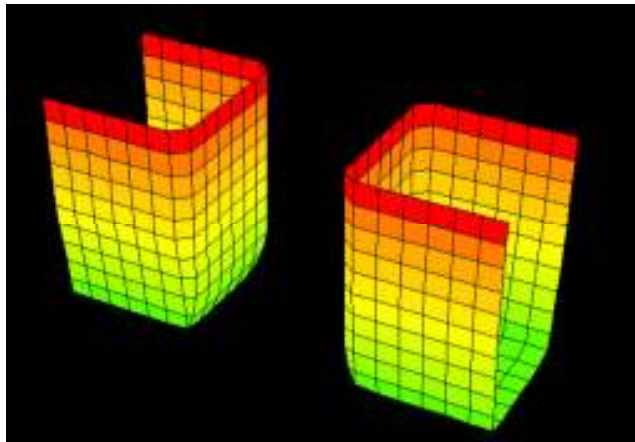
The shape now had eight curved sheets. Making the exponents more negative seemed to increase the number of curved sheets. Then I changed the equation to “ $\text{graph3d}(a*x^{-20}+b*y^{-20}*\sin(c*time)=d*z^{-20})$ ”.

20)", which gave me basically the same shape. Maybe if I made one exponent more negative than the others it would increase the number of sheets.

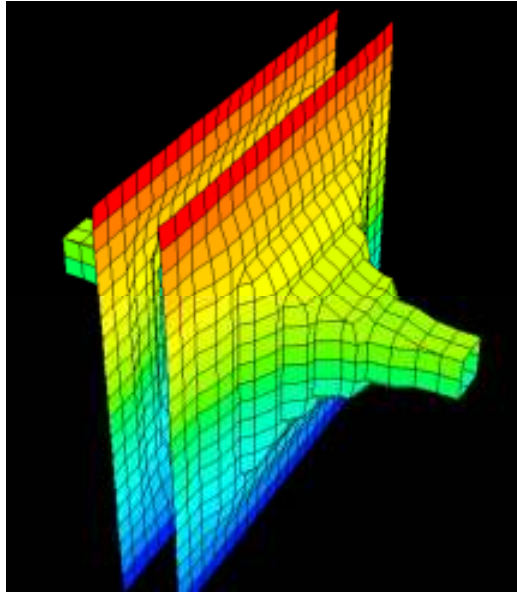
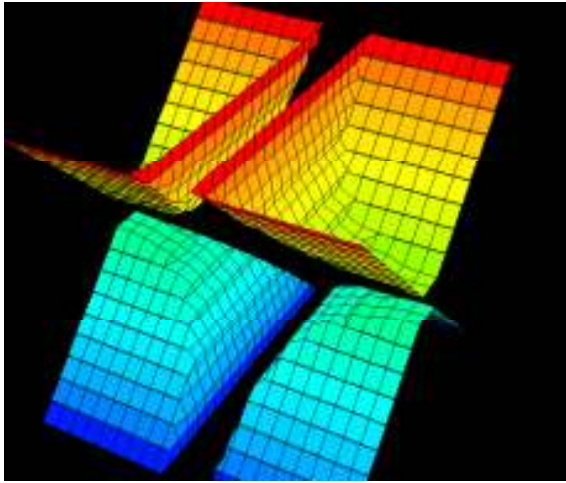
The equation "graph3d(a\*x^-20+b\*y^-2\*sin(c\*time)=d\*z^-2)" gave me a moving figure that went from eight curved sheets to two x's.



What if I made one exponent very negative and another one positive? The equation "graph3d(a\*x^-20+b\*y^20\*sin(c\*time)=d\*z^1)" gave me a very interesting shape:



I had made the exponent of z a simple 1. I decided to change it to a positive 20.



It turned itself inside out, much like when the exponent of  $Z$  was just to 1. What if I made  $z$  negative? Then I got a shape that looked like the previous one except cut in half with the halves rotated 180 degrees.

