

Strake, Mystery Curve, and Preparing for In-class Curves Assessment

Dr. Sarah's Differential Geometry

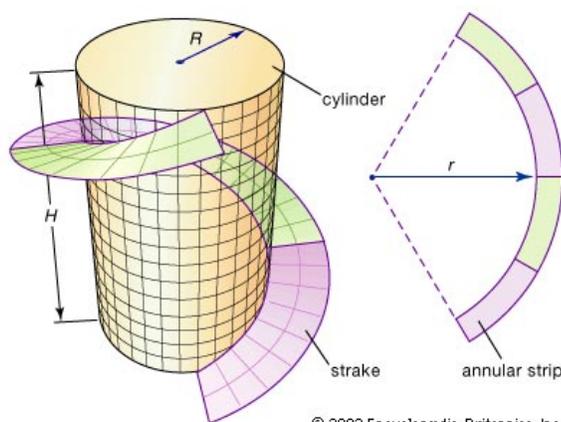
Welcoming Environment: Actively listen to others and encourage everyone to participate! Keep an open mind as you engage in our class activities, explore consensus and employ collective thinking across barriers. Maintain a professional tone, show respect and courtesy, and make your contributions matter.

Try to help each other! Discuss and keep track of any questions your group has. Feel free to ask me questions during group work time as well as when I bring us back together.

1. In comparison with the other choices below, which would be the parametrization for an outer helix on a strake if the inner helix is also one of these? Discuss and then respond at

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- a) $(\cos t, \sin t, \frac{10t}{2\pi})$
- b) $(1.2 \cos t, 1.2 \sin t, \frac{10t}{2\pi})$
- c) $(\frac{\pi^2+25}{\pi^2} \cos t, \frac{\pi^2+25}{\pi^2} \sin t, 0)$
- d) $((\frac{\pi^2+25}{\pi^2} + .2) \cos t, (\frac{\pi^2+25}{\pi^2} + .2) \sin t, 0)$
- e) $(\cos t, \sin t, 0)$



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<https://cdn.britannica.com/22/70822-004-B85BF4BD/strake-strip-dimensions-cylinder-contour-Techniques-differential.jpg>

2. Next, compare and contrast the other curves above.
3. If most of the curves connect to the picture just above, then what would H and R on the left and r on the right be and what would be the width of the strake and annular strip?

4. Mystery curve: In Maple, I input the curve $(\frac{1}{3}(1+s)^{\frac{3}{2}}, \frac{1}{3}(1-s)^{\frac{3}{2}}, \frac{s}{\sqrt{2}})$ and commands as:

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with(Student[VectorCalculus]): with(plots):
x:=1/3*(1+s)^(3/2);
y:=1/3*(1-s)^(3/2);
z:=s/sqrt(2);
curvature:=simplify(Curvature(<x,y,z>,s),trig);
torsion:=simplify(Torsion(<x,y,z>,s),trig);
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Maple outputs the curvature as $\frac{\sqrt{-\frac{2}{(1+s)(-1+s)}}}{4}$ and torsion as $\frac{\sqrt{2}}{4\sqrt{1-s}\sqrt{1+s}}$

Compare the curvature and torsion. If $-1 < s < 1$, then what kind of curve is this?

5. For today, you began the in-class curves assessment guide. Discuss with your group and review.