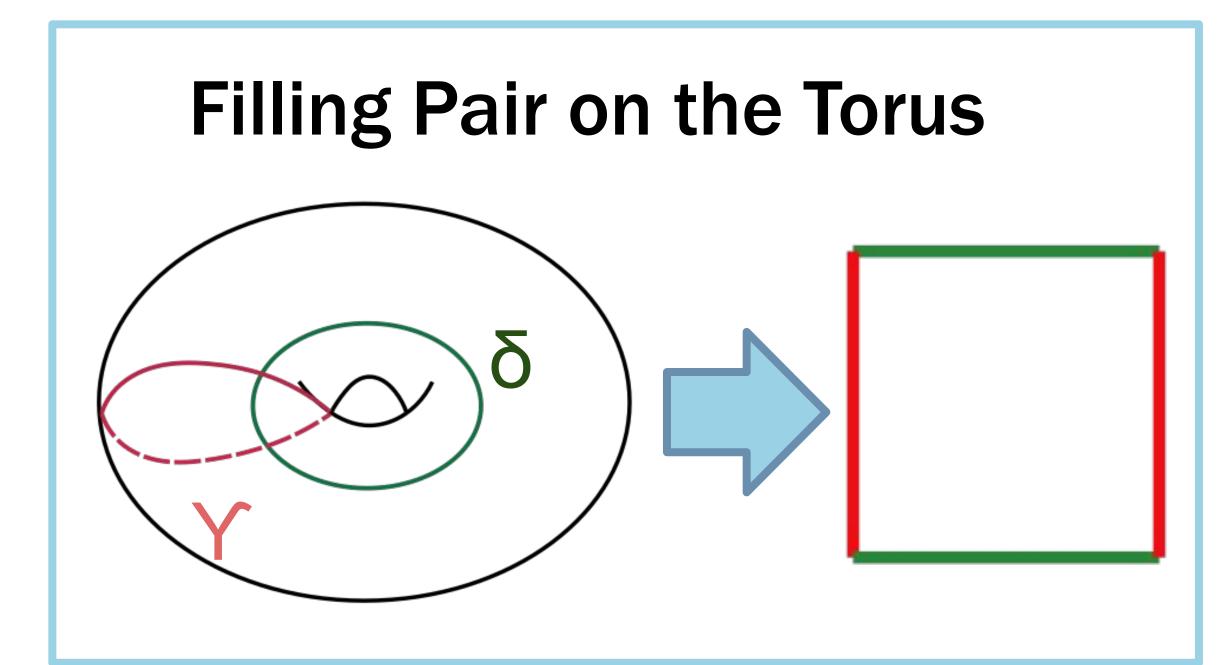
# Counting Filling Pairs on Surfaces Geor Ellie Cirillo<sup>1</sup>, Jiamin Li<sup>2</sup>, Alice Ponte<sup>3</sup> Mentors: Dr. Wade Bloomquist<sup>3</sup> and Dr. Dan Margalit<sup>3</sup>

### Filling Curves on a Surface

- Two curves are **filling** if they cut the surface into a collection of disks.
- If a pair of filling curves intersects minimally, it cuts the surface into a *single* disk.

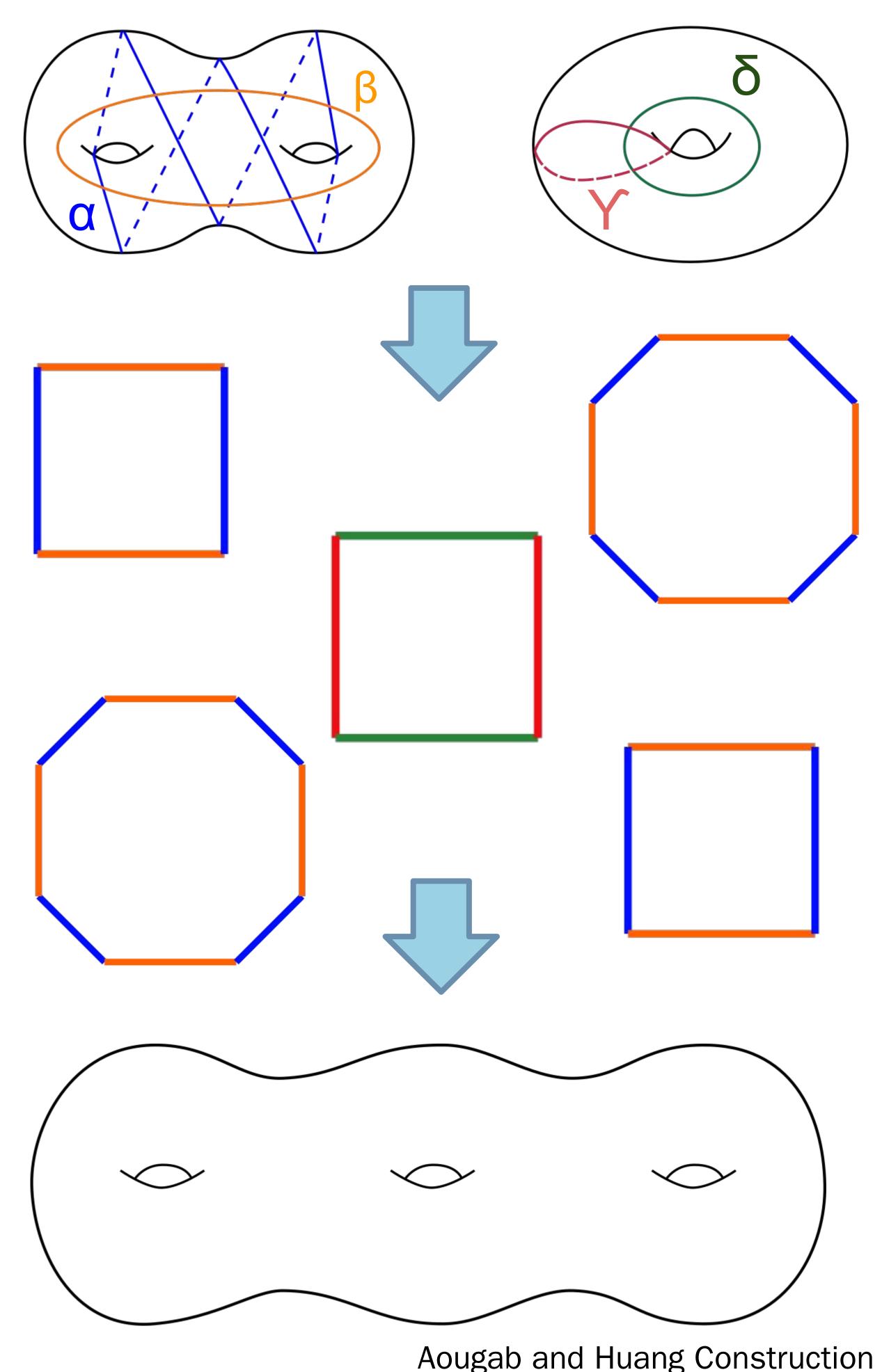


#### Main Question

How many distinct filling pairs of minimally intersecting curves are on a genus g surface?

n(g) = # distinct filling pairs

# **Building Surfaces with Filling Pairs of Curves**





### Theorem

n(3) = 12 n(4) = 672

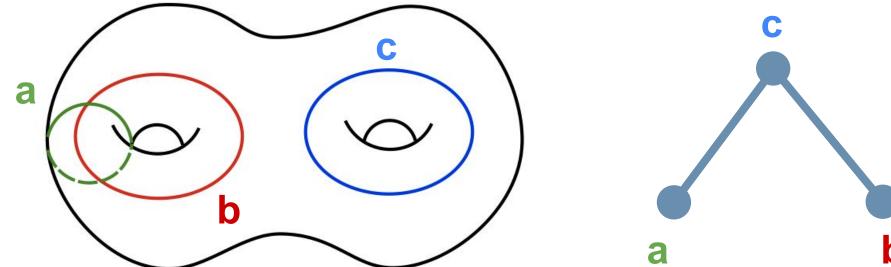
*Technique*: pairs of curves ~ permutations

*Note:* only 8 pairs are **decomposable**.

## **Upper Bound for Genus g Surface**

 $2^{2g-2}(4g-5)(2g-3)! - 2(2g-1)[2 \cdot 2^{2g-4} \cdot (2g)]$  $-4)! + (2(2g - 1) - 6)^2 \cdot 2^{2g - 5}(2g - 5)!]$ 

# **Distance in the Curve Graph**



Palaparthi - Mahanta (2021) (a,b) filling pair  $\rightarrow d(a,T_{h}(a)) = 4$ 

#### Corollary

We have new examples of distance 4 curves.

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