CUMC Handout on July 4, 2013

July-04-13
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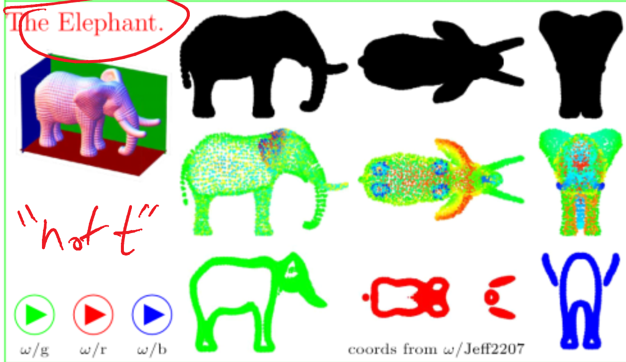
"Flatlanders view an elephant"

Visualizing the Fourth Dimension

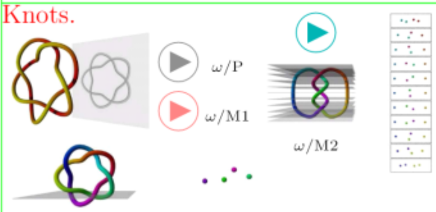
with Ester Dalvit ω/Dal

Abstract. Much as we can understand 3-dimensional objects by staring at their pictures and x-ray images and slices in 2-dimensions, so can we understand 4-dimensional objects by staring at their pictures and x-ray images and slices in 3-dimensions, capitalizing on the fact that we understand 3-dimensions pretty well. So we will spend some time staring at and understanding various 2-dimensional views of a 3-dimensional elephant, and then even more simply, various 2-dimensional views of some 3-dimensional knots. This achieved, we'll take the leap and visualize some 4-dimensional knots by their various traces in 3-dimensional space, and this achieved, I will tell you about the simplest problem in 4-dimensional knot theory whose solution I don't know.

The Elephant.



Knots.

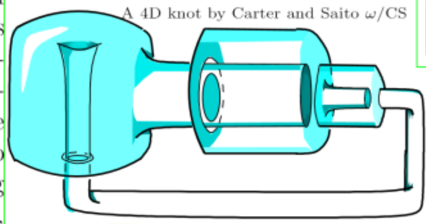


Do one knot "right"

1. Project and hide.
2. Project and colour code.
3. Slice and animate.

The Crossings.

4D Knots.

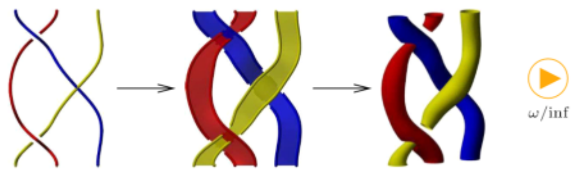


Do one knot "right"

The 4D Crossings.

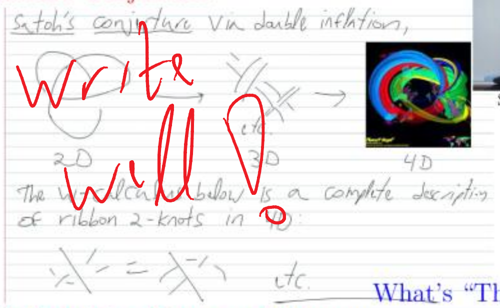
View as flying rings.
View as coloured tubes.
View as cut tubes
View as "inflated bands".

The Inflation Procedure.



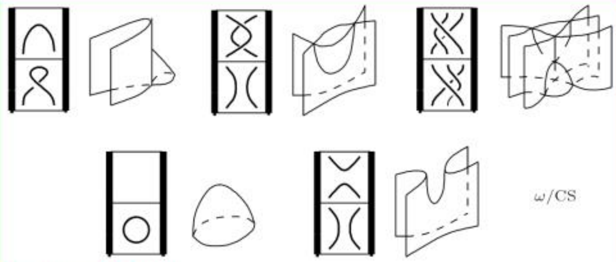
and the Simplest Thing I Don't Know About It

Satoh's Conjecture.



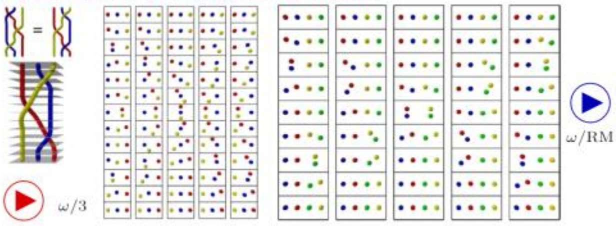
Shin Satoh

What's "The Same"?

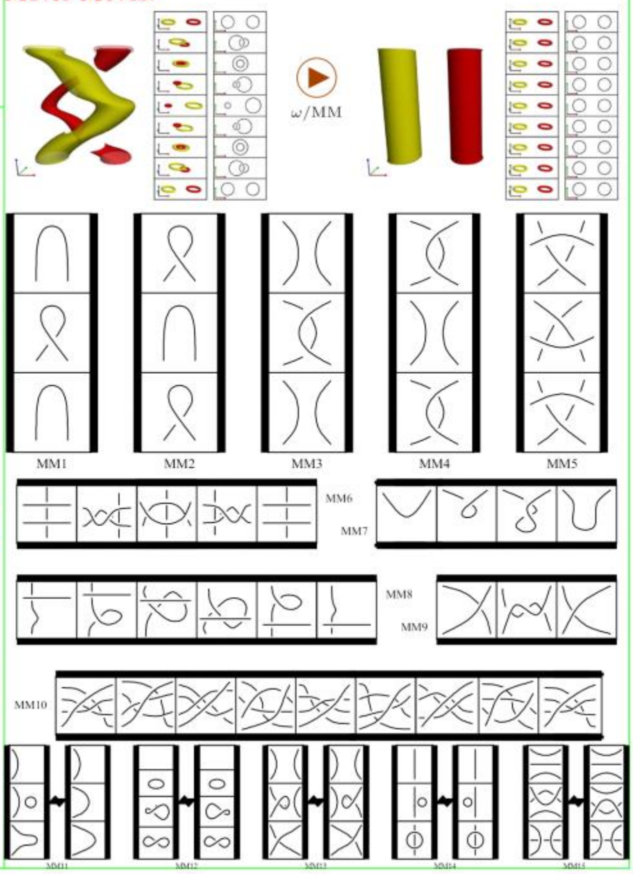


Roseman Moves.

Reidemeister Moves and Theorem.



Movie Moves.



w-Moves.

Carter, Banach, Saito