

# Chirality of Alternating Knots in $S \times I$

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Many alternating knots, such as the figure-eight knot, are isotopic to their mirror image in  $S^3$ . Detecting amphichiral knots in  $S^3$  can be difficult. The situation for alternating knots embedded in a surface cross an interval is quite different. There is a well defined projection in a such a space, and we define the mirror image of a knot to be the reflection across the projection surface. We can then show if an alternating knot  $K$  is non-trivially embedded in  $S \times I$ , where the genus of  $S$  is greater than zero, then  $K$  is not isotpic to its mirror image. In other words, such a knot is chiral.

We prove this result by studying the span of a generalized Kauffman polynomial of the knot, as well as the polynomial of lifts of the knot in certain covering spaces of  $S$ . The condition of “nontrivially embedded” is necessary to avoid the obvious counterexample induced by embedding a small  $S^3$  into  $S \times I$ .