

FName. Traffic.

Title. Car Traffic on Knot Diagrams and Some Cool Knot Invariants.

Abstract. We will study some strange traffic rules for cars driving through an interchange: When they enter via an underpass, they just go through. But when they enter via an overpass, they fall down to the underpass with some small probability p , and then keep going unharmed, down under.

We will learn that to analyze this traffic game we need matrices and that to play it better we need probabilities that are not numbers between 0 and 1. We will also learn how this game can be used to define some knot invariants (a notion we will explain) which may be the best we presently have.

1. Knots and knot diagrams; knot invariants.
2. The traffic rules: positive crossings only!
3. Example: A kink.
4. Example: The positive trefoil.
5. Relative invariance under $R3$.
6. Failure of relative invariance under $R2$.
7. The full traffic rules and algebraic probability theory.
8. Relative invariance under $R2$, $R2c$.
9. ρ_1 , θ .
10. Computability.
11. Pictures and table galore.
12. What we don't know.
13. Morals:
 - a. Can solve complicated problems with matrices!
 - b. There's some "probability" even outside $[0,1]$!
 - c. There's still a lot to do!