

## **Abstract**

We study dynamics of the horocycle flow on strata of translation surfaces, introduce new invariants for ergodic measures, and analyze the interaction of the horocycle flow and real Rel surgeries. We use this analysis to complete and extend results of Calta and Wortman classifying horocycle-invariant measures in the eigenform loci. In addition we classify the horocycle orbit-closures and prove that every orbit is equidistributed in its orbit-closure. We also prove equidistribution results describing limits of sequences of measures. Our results have applications to the problem of counting closed trajectories on translation surfaces of genus 2.