

# Arcs, orthogeodesics, and hyperbolic surface identities

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Let  $X$  be a compact hyperbolic surface with either geodesic or horocyclic boundary. The homotopy class (rel the boundary) of a non-trivial arc from the boundary to itself can be realized by an *orthogeodesic*- a geodesic segment perpendicular to the boundary at its initial and terminal points. This talk is about a special subclass of orthogeodesics called *primitive* orthogeodesics. In ongoing work with Hugo Parlier and Ser Peow Tan we show that the primitive orthogeodesics arise naturally in the study of maximal immersed pairs of pants in  $X$  and are intimately connected to regions of  $X$  in the complement of the natural collars. These considerations lead to continuous families of new *identities*-equations that remain constant on the space of hyperbolic structures.