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Geometric Properties of Harmonic Shears

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Abstract. This paper is a study of planar harmonic mappings produced with the “shear construction” devised by Clunie and Sheil-Small in 1984. Specifically it will describe the geometry of mappings produced by the shear construction. The first section introduces basic concepts, including a description of the shear construction itself, a technique for constructing examples of harmonic mappings by shearing a conformal mapping. The main body of the paper alternates between presenting examples of harmonic shears, illustrating them graphically with the help of MATHEMATICA software, and using an integral representation of the harmonic shear to explain and predict characteristics of the image domain.

Keywords. Harmonic mapping, harmonic shear, boundary behavior.

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