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Melkana A Brakalova* (brakalova@fordham.edu), 441 East Fordham Road, Mathematics Department, JMH 417, Fordham University, Bronx, NY 10458. *Circle-like homeomorphisms and homogeneity at a point.*

A homeomorphism is circle-like at a point if its circular dilatation is 1. A special case of circle-like homeomorphisms are those that are conformal at a point or homogeneous at a point (asymptotic homogeneity).

Using modules of ring domains Teichmüller (1938) developed methods (e.g. the Modulsatz) to study conformality at a point for K -quasiconformal mappings. Later B. Rodin and S. Warschawskii (1976) applied some of these methods to study the boundary behavior of conformal maps and to attack a famous question concerning existence of an angular derivative at a boundary point. Gutlyanskii and Ryazanov (1995) proved deep results concerning asymptotic homogeneity for K -quasiconformal mappings using different methods.

We build on the methods developed in the above works of Teichmüller, Rodin, Warschawskii to provide sufficient and necessary conditions for homeomorphic solutions of the relaxed (degenerate) Beltrami equation to be circle-like at a point. These results are applied to obtain geometric and analytic conditions for homogeneity at a point, that relate to the works of Gutlyanskii and Ryazanov. The geometric conditions are in terms of modules of families of curves and the analytic conditions are in terms of the complex dilatation. (Received January 31, 2009)