

The Spring Topology and Dynamics Conference 2009, March 7–9, 2009, University of Florida, Gainesville, FL, USA

**HOMOTOPIC MAPS BETWEEN PLANAR PEANO CONTINUA
ARE DETERMINED BY THE FUNDAMENTAL GROUP
HOMOMORPHISM**

PAUL FABEL

Our main result is if X is a planar Peano continuum and Y is any planar set then two based maps from X to Y are homotopic if and only if they determine the same homomorphism between fundamental groups. A critical step, a secondary result, is to prove if Z is the complement of a connected open planar set, then Z can be embedded in a nonseparating planar continuum W by attaching to Z a null sequence of arcs with disjoint interiors. The latter construction generalizes some recent work of Blokh, Misiurewicz and Oversteegen (who employ a similar strategy treating the special case when the nontrivial components of Z form a null sequence of Peano continua). Our particular approach exploits the CAT(0) geometry of PL planar sets determined by internal paths of minimal length. Our main result also exploits asphericity of planar sets (proved by Cannon/Conner/Zastrow 2002) and π_1 injectivity of planar Peano continua (proved for planar sets by Fisher/Zastrow 2005) to build the desired homotopy.

MISSISSIPPI STATE UNIVERSITY
E-mail address: `fabel@ra.msstate.edu`