

# Homeomorphic Planar Harmonic Mappings

Vincenzo Nesi, Sapienza Roma

I will present joint work with Giovanni Alessandrini, Trieste.

## Abstract

A planar harmonic mapping  $U = (u^1, u^2)$  on an open set  $A$  is simply a pair of harmonic functions on  $A$ . We will review classical and recent results about planar harmonic mappings. We will then recall recent extensions to pairs of solutions to the more general linear PDE  $\operatorname{div}(\sigma \nabla u) = 0$  with  $\sigma$  a measurable symmetric, uniformly bounded and elliptic matrix and explain *some* of the many connections with quasiconformal mappings and homogenization. Finally we present a rather substantial extension of a classical theorem of Kneser (often called the Radò-Kneser-Choquet Theorem) about sufficient conditions for a planar harmonic mapping to be a homeomorphism.