

# The 1-harmonic flow with values into a sphere

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The 1-harmonic flow is the formal gradient flow of the total variation functional with respect to the  $L^2$ -distance. The case in which the unknown is a vector-field, constrained to take values into an hyper-octant of the  $N$ -dimensional unit sphere, originates from image processing and has an intrinsic analytical interest as a prototype of constrained and vector-valued evolution equations in BV-spaces. In this lecture I will present an existence result for this problem under homogeneous Neumann boundary conditions, obtained jointly with Lorenzo Giacomelli and Salvador Moll. An essential tool will be a relaxation-type argument for a non-convex functional: it leads to a minimization problem which consists in finding geodesics in a closed manifold with boundary of the sphere with respect to a metric which penalizes the latitude.

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