

# HARMONIC MAPS AND BIHARMONIC MAPS

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ABSTRACT. Harmonic maps between Riemannian manifolds are the critical points of energy functionals, which were established by James Eells and Joseph H. Sampson in 1964. In terms of Euler-Lagrange equations, they satisfy the second order elliptic systems of partial differential equations. We will discuss the history and developments of harmonic maps briefly. Biharmonic maps were first studied by Guoying Jiang in 1986, which generalize harmonic maps and satisfy the fourth order elliptic systems of PDEs. In these two decades, there has been progress in biharmonic maps made by a number of mathematicians. We will discuss the developments of biharmonic maps briefly. I will present a few results of my research in harmonic maps and biharmonic maps. Wave maps are harmonic maps on Minkowski spaces, which satisfy the second order of hyperbolic systems of PDEs. Biwave maps are biharmonic maps on Minkowski spaces, which satisfy the fourth order hyperbolic systems of PDEs. We will mention wave maps and biwave maps very briefly if time permits.