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Lojasiewicz-Simon gradient inequalities and convergence of weak gradient flows to weak limits.

Development and application of the Lojasiewicz-Simon gradient inequality was pioneered by Leon Simon in his analysis of global existence and convergence of gradient flows defined by certain analytic functions on Banach spaces arising in geometric analysis. This paradigm has been successfully used to prove global existence and convergence for all time of Yang-Mills and harmonic map gradient flows near smooth critical points that are local minima of the energy functions. We shall describe a new proof of the Lojasiewicz gradient inequality for an analytic function on Euclidean space and a Lojasiewicz-Simon gradient inequality for weak gradient flows that may be used to prove convergence for weak limits allowing for energy bubbling for the conformally invariant Yang-Mills energy function in dimension four and the harmonic map energy function in dimension two. (Received November 04, 2017)