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Leiga Zhao, Fukun Zhao and Junping Shi* (jxshix@wm.edu), Department of Mathematics,
College of William and Mary, Williamsburg, VA 23187. *Elliptic Systems of Schrödinger type with
quadratic nonlinearities.*

It is known that Second Harmonic Generation (SHG) can occur when the optical material has a $\chi(2)$ (i.e. quadratic) nonlinear response instead of conventional Kerr $\chi(3)$ material. Here we consider the soliton solutions of nonlinear SHG Schrödinger system in a higher dimensional space. We prove the existence of a positive ground state solution for all parameter range, and we also study the continuity of the ground states and the asymptotic behavior of the ground state when the parameter approaches zero or infinity. The uniqueness of positive solution is also proved in some cases. We also consider the multiplicity of the solutions and the case of system on a bounded domain using a new bifurcation approach. (Received January 19, 2015)