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The FitzHugh-Nagumo equations are a simplified version of the Hodgkin-Huxley equations of mathematical biology describing the propagation of signals along nerve fibers. Numerical studies indicate that the FitzHugh-Nagumo system exhibits stable traveling pulse solutions with oscillatory tails. We discuss an analytical result regarding the existence of such pulses using geometric blow up techniques and singular perturbation theory. We also describe numerical results regarding the stability of the pulses, and we propose a mechanism that explains the transition from single to double pulses that was observed in earlier numerical studies. (Received January 14, 2015)