New Trends in Onedimensional Dynamics
Celebrating the 70th anniversary of Welington de Melo

Title: A generalization of a linearization theorem of Philip Hartman

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Abstract: A linear automorphism L of R^n is "bi-circular" if its spectrum lies in two disjoint circles C_1, C_2 in the complex plane such that the radius of C_1 is less than 1 and the radius of C_2 is greater than 1. A fixed point p of C^1 diffeomorphism f is "bi-circular" if the derivative $Df(p)$ is bi-circular. A well-known theorem of Philip Hartman says that a bi-circular fixed point p of a $C^{1,1}$ diffeomorphism f (i.e. the derivative map is Lipschitz near p) is C^1 linearizable near p. We extend this to the case in which f is $C^{1,a}$ with $0 < a < 1$ (i.e., Df is Holder continuous with exponent a). Our proof also works in the infinite dimensional case where R^n is replaced by a real Banach space which has $C^{1,a}$ bump functions (e.g. Hilbert spaces). The results can be used to give simpler proofs under weaker differentiability assumptions of results of L. P. Shilnikov (and his collaborators) giving horseshoe type dynamics near certain homoclinic curves.