1056-92-603 **Jim M Cushing*** (`cushing@math.arizona.edu`), Department of Mathematics, 617 N Santa Rita, University of Arizona, Tucson, AZ 85721. *The fundamental bifurcation theorem for Darwinian matrix models.* Preliminary report.

Matrix models of the form $x(t+1) = P\,(x(t))\,x(t)$ are used to describe the (discrete time) dynamics of structured populations. I will show how one can extend the Fundamental Bifurcation Theorem for such matrix models to Darwinian matrix models. A Darwinian matrix model is an (evolutionary game theoretic) extension of a population model which accounts for evolution that results when a phenotypic trait u is subject to natural selection. Secondly, for Darwinian matrix models I will show how the basic properties of the fundamental bifurcation can be ascertained either by means of the inherent growth rate r or the inherent net reproductive number R_0. This result is not obvious because in general there is no particular relationship between the monotonicity and concavity properties of $r = r(u)$ and $R_0 = R_0(u)$ as functions of the trait u. This result can be a significant aid to the study of Darwinian matrix models since R_0 is typically more mathematically tractable than r. I'll illustrate this with some applications. (Received September 14, 2009)