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Brahima Mbodje* (BrahMbodje@yahoo.com), Division of Mathematics and Sciences, Rust College, 150 Rust Avenue, Holly Springs, MS 38635. *Stability and Bifurcation in a Fractionally Damped Nonlinear Diffusion Process.*

We consider a nonlinear diffusive model for the flow of a viscoelastic fluid whose heredity may be described in terms of fractional order integrals. We prove the existence of solutions. We also prove the existence of a global attractor and establish conditions for the existence of an energy functional. This energy functional allows us to give a description of the attractor for certain values of the model parameters. We also study the stability and bifurcation of stationary solutions. Finally, the existence of periodic and homoclinic orbits is also tackled using Bogdanov-Takens singularity. (Received August 09, 2005)