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**Bo Zhang\*** (bzhang@uncfsu.edu), Department of Math and Computer Science, Fayetteville State University, 1200 Murchison Road, Fayetteville, NC 28301. *Stability by Fixed Point Theory for Nonlinear Delay Differential Equations*. Preliminary report.

In this paper we study a system of nonlinear differential equations with variable delays and give conditions to ensure that the zero solution is asymptotically stable by applying Schauder's fixed point theorem. These conditions do not require the boundedness of delays, nor do they ask a fixed sign condition on the coefficient functions. The paper is motivated by a number of difficulties encountered in the study of system stability by means of Lyapunov's direct method. We notice that most of these difficulties vanish when applying fixed point theory. While Lyapunov's direct method usually asks pointwise conditions on the functions governing the system, the stability results we offer ask conditions of an averaging nature. Stability and asymptotic stability theorems with necessary and sufficient conditions are proved. The reader will also see how very complete, simple, and rigorous analysis on a highly challenging stability problem can be achieved using fixed point theory in the space of continuous functions with the supremum norm. (Received January 18, 2021)