Bounded and periodic solutions of infinite delay evolution equations

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Abstract: For A(t) and f(t, x, y) T-periodic in t, we consider the following evolution equation with infinite delay in a general Banach space X: u? (t) + A(t)u(t) = f(t, u(t), u_t), t > 0, u(s) = ??(s), s ?? 0, (0.1) where the resolvent of the unbounded operator A(t) is compact, and u_t(s) = u(t + s), s ?? 0. By utilizing a recent asymptotic fixed point theorem of Hale and Lunel (1993) for condensing operators to a phase space C_g, we prove that if solutions of Eq. (0.1) are ultimate bounded, then Eq. (0.1) has a T-periodic solution. This extends and improves the study of deriving periodic solutions from boundedness and ultimate boundedness of solutions to infinite delay evolution equations in general Banach spaces; it also improves a corresponding result in J. Math. Anal. Appl. 247 (2000) 627-644 where the local strict boundedness is used.

Author Keywords: Bounded and periodic solutions; Condensing operators; Hale and lunel's fixed point theorem; Infinite delay

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