Abstract Submitted
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An Approximation to the Periodic Solution of a Differential Equation of Abel RONALD E. MICKENS, Clark Atlanta University — The Abel equation, in canonical form, is $y' = \sin t - y^3$(*) and corresponds to the singular ($\varepsilon \to 0$) limit of the nonlinear, forced oscillator $\varepsilon y'' + y' + y^3 = \sin t$, $\varepsilon - > 0$. (**) Equation (*) has the property that it has a unique periodic solution defined on $(-\infty,\infty)$. Further, as t increases, all solutions are attracted into the strip $|y| < 1$ and any two different solutions $y_1(t)$ and $y_2(t)$ satisfy the condition

$$\text{Lim } [y_1(t) - y_2(t)] = 0, \text{ (***)}$$

$t \to \infty$ and for t negatively decreasing, each solution, except for the periodic solution, becomes unbounded.[1] Our purpose is to calculate an approximation to the unique periodic solution of Eq. (*) using the method of harmonic balance. We also determine an estimation for the blow-up time of the non-periodic solutions.

[1]U. Elias, American Mathematical Monthly, vol.115, (Feb. 2008), pps. 147-149.

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