On the approximation of periodic solutions of non-autonomous ordinary differential equations

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We recover the pioneering results of Stokes [3] and Urabe [4] that provide a theoretical basis for proving that near truncated Fourier series that approach a periodic solution of an ordinary differential equations there are actual periodic solutions of the equation. This result can be applied independently of the method that has been used to get these approximation. We will restrict our attention to one-dimensional non-autonomous ordinary differential equations and we apply the results obtained to a couple of concrete examples coming from planar autonomous systems [1]. In one of them we use the Harmonic balance method to get an approximated solution while in the other we use a numerical approach.

References

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