# Averaging theorems for dynamic equations on time scales

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Classical averaging theorems for ordinary differential equations are concerned with the initial-value problem

$$x'(t) = \varepsilon f(t, x(t)) + \varepsilon^2 g(t, x(t), \varepsilon), \quad x(t_0) = x_0,$$

where $\varepsilon > 0$ is a small parameter. According to these averaging theorems, a good approximation of the solution can be obtained by considering the autonomous differential equation

$$y'(t) = \varepsilon f^0(y(t)), \quad y(t_0) = x_0,$$

where $f^0(y) = \lim_{T\to\infty} \frac{1}{T} \int_{t_0}^{t_0+T} f(t, y)\,\mathrm{d}t$.

The aim of the talk is to present time scale analogues of both periodic and non-periodic averaging theorems, as well as a related theorem on the existence of periodic solutions of dynamic equations (see [1, 2]). We make use of the correspondence between dynamic equations and generalized ordinary differential equations (see [3]).

## References

[1] J. G. Mesquita, A. Slavík, *Periodic averaging theorems for various types of equations*, J. Math. Anal. Appl. **387** (2012), 862–877.

[2] A. Slavík, *Averaging dynamic equations on time scales*, J. Math. Anal. Appl. **388** (2012), 996–1012.

[3] A. Slavík, *Dynamic equations on time scales and generalized ordinary differential equations*, J. Math. Anal. Appl. **385** (2012), 534–550.