An averaging method for a semilinear equation

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We discuss an abstract averaging method for a semilinear equation

$$Lx = \varepsilon N(x, \varepsilon),$$

where L is a Fredholm mapping of index zero, and N is a nonlinear operator. The applicability of the method for periodic solutions to n-th order differential equation and nonlocal nonlinear boundary problems is discussed. The talk is based on a joint paper
J.A. Cid, J. Mawhin, M. Zima, An abstract averaging method with applications to differential equations, J. Differential Equations 274 (2021), 231–250.