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Ivana Kovacic* (ivanakov@uns.ac.rs), Faculty of Technical Sciences, Trg D. Obradovica 6, University of Novi Sad, 21215 Novi Sad, Vojvodina, Serbia. *Truly Nonlinear Oscillators: from their Mathematical Models, the Methods for their Quantitative Investigations to the Phenomena Associated with their Behaviour.*

This lecture is concerned with truly nonlinear oscillators: their restoring force is an odd, single-term powered-form function whose power can be any non-negative real number. First, several mathematical models of this type of force are discussed and their characteristics with respect to a linear restoring force and a multi-term powered-form restoring force that contains a linear term are emphasized. Then, the lecture focuses on free truly nonlinear conservative oscillators. Exact solutions for their motion expressed in terms of Lyapunov's function and Rosenberg's Ateb functions are considered. In addition, the approach for obtaining very accurate approximate solution for their motion by means of elliptic functions, which has recently been developed by the author and her colleague, is presented. The extensions of this approach to autonomous and non-autonomous non-conservative oscillators are also explained. Some alternative techniques developed by the author that use trigonometric functions but enable one to study both weakly and strongly truly non-linear oscillators are presented as well. Finally, the phenomena arising in truly nonlinear oscillators are addressed and their differences with respect to linear oscillators and other types of nonlinear oscillators are pointed out. (Received September 11, 2012)