

## عنوان مقاله:

A New Approach for Solving Nonlinear Differential Equations with Poincare Map and Poincare Section

## محل انتشار:

مجله مهندسی برق مجلسی، دوره 10، شماره 3 (سال: 1395)

تعداد صفحات اصل مقاله: 12

## نویسندگان:

Ghasem Sadeghi Bajestani - Imamreza University, Mashhad, Iran

Ali Sheikhani - Amirkabir University, Tehran, Iran

Seyed Mohammad Reza Hashemi Golpayegani - Amirkabir University, Tehran, Iran

Farah Ashrafzadeh - Mashhad University of Medical Sciences, Mashhad, Iran

Paria Hebrani - Mashhad University of Medical Sciences, Mashhad, Iran

## خلاصه مقاله:

Solving many of the scientific problems in physics and engineering leads to differential equations, which in many cases no analytical answers can be found. The question to be considered is that if the available numerical methods for solving differential equations (that are all done by computers) are reliable. Is the Lipschitz validity assumption on differential equations with nonlinear dynamics true? What is the reason for the contradictory outcomes of solving a simple equation using numerical methods? Do the outcomes show the reality of the dynamic system? What is the acceptable replacement for the current methods? All the phenomena of the world have bifurcations, singularity, dissociation, behavioral changes and interaction; and today, science with assumptions like neglecting interactions and singularities, consider the systems as a continuous model, although we are in need of a model in which we can solve the problem without inserting the changes in time approach to zero chain. In this article, accompanied by showing different and contradictory results –which are all wrong– numerical methods for solving a simple differential equation and comparing them with analytical method, we introduce Poincare as a substitution for overcoming this scientific derivation. In this article we solved a differential equation with common numerical methods in MATLAB, and showed that these methods produce conflicting outcomes, and then we solved it using Poincare. After showing the invalidity of common numerical methods and introduction of a simple decomposition method, we investigated Van der Pol equations using Poincare, and showed the fact that Poincare can simply show the system dynamics like a flashlight.

## کلمات کلیدی:

en

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1749052>



