

Boubaker collocation method to solve the single degree of freedom system

Şuayip Yüzbaşı¹ and Beyza Çetin¹

¹Akdeniz University, Faculty of Science, Department of Mathematics, Antalya, Turkey,
syuzbasi@akdeniz.edu.tr, beyzaccetinn@gmail.com

In many mechanical vibration situations, a complex system can be idealized as a single degree of freedom spring-mass system [1]. This research offers a new and straightforward method for single degree of freedom system in terms of Boubaker polynomials. On the basis of this method, the solution of the problem is approximated by truncated Boubaker series [2]. The assumed solution and its derivatives are written in the matrix form and then they are substituted in the equation. By utilizing the collocation points, the equation is transformed into a system of linear algebraic equations. This system is expressed in the matrix form. Finally, a new system is obtained by using this last system and the conditions. The solution of this system determines coefficients of the assumed solution. The effectiveness of the method is mentioned as a result of comparing the obtained results with the exact solution.

References

- [1] N. Kurt, M. Cevik, Polynomial solution of the single degree of freedom system by Taylor matrix method *Mechanics Research Communications*, **35(8)** (2008) 530–536.
- [2] S. Yalçınbaş, T. Akkaya, A numerical approach for solving linear integro-differential-difference equations with Boubaker polynomial bases, *Ain Shams Engineering Journal*, **3(2)** (2012) 153–161.