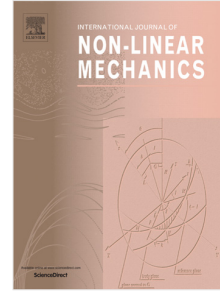


## Accepted Manuscript

Geometrically nonlinear transient analysis of laminated composite super-elliptic shell structures with generalized differential quadrature method

Gökçe Akgün, Hasan Kurtaran



PII: S0020-7462(17)30588-7  
DOI: <https://doi.org/10.1016/j.ijnonlinmec.2018.05.016>  
Reference: NLM 3024

To appear in: *International Journal of Non-Linear Mechanics*

Received date: 16 August 2017  
Revised date: 18 May 2018  
Accepted date: 20 May 2018

Please cite this article as: G. Akgün, H. Kurtaran, Geometrically nonlinear transient analysis of laminated composite super-elliptic shell structures with generalized differential quadrature method, *International Journal of Non-Linear Mechanics* (2018), <https://doi.org/10.1016/j.ijnonlinmec.2018.05.016>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Geometrically Nonlinear Transient Analysis of Laminated Composite Super-elliptic Shell Structures with Generalized Differential Quadrature Method

Gökçe Akgün, Hasan Kurtaran\*

Department of Mechanical Engineering, Gebze Technical University, Gebze, Kocaeli, Turkey

## Abstract

In this study, geometrically nonlinear dynamic behavior of laminated composite super-elliptic shells is investigated using generalized differential quadrature method. Super-elliptic shell can represent cylindrical, elliptical or quasi-rectangular shell by adjusting parameters in super-ellipse formulation (also known as Lamé curve formulation). Geometric nonlinearity is taken into account using Green-Lagrange nonlinear strain-displacement relations that are derived using differential geometry and theory of surfaces. Transverse shear effect is considered through the first-order shear deformation theory. Equation of motion is obtained using virtual work principle. Spatial derivatives in equation of motion is expressed with generalized differential quadrature method and time integration is carried out using Newmark average acceleration method. Several super-elliptic shell problems under uniform distributed load are solved with the proposed method. Effects of layer orientations, boundary conditions, ovality and ellipticity on dynamic behavior are investigated. Transient responses are compared with finite element solutions.

**Keywords:** Generalized Differential Quadrature, Transient Analysis, Geometric Nonlinearity, Laminated Composite, Super-elliptic Shell

---

\* Corresponding author.

Phone: +90 262 605 27 78, Fax: +90 (262) 653 84 90.

E-mail address: [hasan@gtu.edu.tr](mailto:hasan@gtu.edu.tr), [kurtaranhasan@gmail.com](mailto:kurtaranhasan@gmail.com)

Download English Version:

<https://daneshyari.com/en/article/8947683>

Download Persian Version:

<https://daneshyari.com/article/8947683>

[Daneshyari.com](https://daneshyari.com)