A Numerical Method for the jerk of Structural Dynamic Response

*Xu Ji-qing^{1,2}, †Li Yan-ting^{1,2}

¹School of River & Ocean Engineering, Chongqing Jiaotong University, Chongqing 400074, P.R.China;
²National Engineering Technology Research Center for Inland Waterway Regulation, Key Laboratory of Hydraulic & Waterway Engineering of the Ministry of Education, Chongqing Jiaotong University, Chongqing 400074, P.R.China

> *Presenting author: plappk@sina.com †Corresponding author: lijoan@outlook.com

Abstract

Jerk has a great significance in engineering practice. A numerical method for solving dynamic response is constructed through combination of the radial basis function approximation and the collocation method. The proposed method can be used to calculate the jerk and the jerk equation, the three-order differential equation, adopting RBF interpolation to approach the real movement rule, which makes up the defect that the traditional methods can't be used to calculate the jerk. Aimed at the numerical characteristics of the differential equation, an improved RBF expression of joint interpolation combining the all-order derivatives of the variate is presented. And adding an initial-value condition whose order is equal to the differential equation's can obviously decrease the numerical oscillation. The results of the numerical examples indicate that the proposed method have the advantages of simple calculation process, high accuracy, and significant applicability to jerk equation.

Key words: jerk; radial basis function; structural dynamic response; initial-value problem; jerk equation