A Novel Wave Approach Solution for Free Vibration of Circular Membrane Using Conversion of Standing Wave into a Moving Wave

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ABSTRACT Among physical applications of a simple approximation of Bessel function of integer order can be referred to finding natural frequencies of the circular membrane using the novel method from the wave approach. In general, wave approach cannot be employed in the case of standing waves. This shortcoming can be removed by utilizing the idea of converting the standing-waves into moving-waves. By so doing, Bessel function which is a standing wave can be replaced by an exponential function. As a consequence of this conversion, it will be much easier to carry out variety of mathematical operation on the newly derived moving-wave in the form of exponential function. The results of present study evince that the solution obtained by this approach is so accurate and the same as those derived by using the cylindrical wave functions that will be investigated in this paper from wave approach. Of the important application of wave approach analysis is study of crack in mechanical systems. When we use the classical method for the systems having the crack, the relations will be complicated. This method can be applied to membrane which has discontinuities such as cracks, because the wave approach is convenient for these systems.