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Research on the analytic solution of double modulus beam deformation based on Chebyshev function. (Chinese. English summary) [Zbl 07448839]

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Summary: In this paper, Chebyshev function is used to construct the axial displacement functions of the tensile zone and the compression zone of the double modulus beam, and the expressions of the axial displacement functions of these zones are determined by using the shear stress formula of the cross section. Then the displacement geometric equation is used to obtain the bending differential equation and the bending normal stress formula of the double modulus beam. The calculation results show that when Chebyshev function is used to solve the analytic solution of double modulus beam during deformation, the calculation accuracy is very high, and when the function is used to study the bending deformation of double modulus beam under complex loads, the deflection curve equation can be obtained conveniently. However, the elastic mechanics method is difficult to obtain this deflection curve equation. The deflection curve of the beam section of the double modulus beam with opposite bending moment direction is discontinuous, because the neutral axes of the two beam sections are not on the same horizontal line when bending.

MSC:

74H10 Analytic approximation of solutions (perturbation methods, asymptotic methods, series, etc.) of dynamical problems in solid mechanics

Keywords:

Chebyshev function; double modulus beam; analytical solution; axial displacement; geometric equation; normal stress; deflection curve

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