Modern Methods for Learning the Basics of Structural Stability: From Behavior to Practice
Session 3: Behavior of Flexural Members – The Fundamentals – October 20, 2020
Due: November 17, 2020, 8:00 am EST – Submit through the online form

1. Strength limit states for flexural members include:
    a. inelastic lateral-torsional buckling.
    b. full yielding.
    c. local buckling.
    d. elastic lateral torsional buckling.
    e. all of the above.

2. Which of the following is not one of the assumptions related to the theoretical lateral-torsional buckling load that was derived in the lecture?
    a. Only major axis bending occurs before buckling.
    b. The member is prismatic.
    c. The member is braced at the ends.
    d. The member is subjected to a uniformly distributed load.
    e. The material behaves linear elastically.

3. Two key components in developing the governing differential equation related to lateral torsional buckling problems are:
    a. major and minor axis flexure.
    b. major axis flexure and torsion.
    c. minor axis flexure and torsion.
    d. major axis flexure and compression.
    e. none of the above.

4. True or False: The elastic lateral-torsional buckling moment depends on both the modulus of elasticity, E, and the shear modulus of elasticity, G.
    a. True
    b. False

5. True or False: The elastic lateral-torsional buckling moment depends on both the major axis and minor axis moments of inertia, I_x and I_y.
    a. True
    b. False

6. Which of the following can be observed from the finite element analysis in Example 1?
    a. The linear buckling analysis (LBA) gave the minimum critical moment for the longer unbraced length.
    b. The material nonlinear analysis (MNA) gave the minimum critical moment for the shorter unbraced length.
    c. The geometric nonlinear analysis gave results closer to the LBA analysis than the MNA analysis for both unbraced lengths.
    d. All of the above

7. For a full range of unbraced lengths, which of the following is <u>not</u> true?
    a. plastic moment capacity may exceed the elastic lateral-torsional buckling (LTB) strength.
    b. plastic moment capacity always exceeds inelastic LTB strength.
    c. elastic LTB strength may exceed the inelastic LTB strength.
    d. plastic moment capacity is impacted by the presence of residual stresses.
    e. L_r always exceeds L_p.

8. Which of the following is correct about the AISC *Specification* equation for the moment gradient factor, C_b?
    a. It depends on the moments at the third points on the span.
    b. Negative moment values should be used in the equation when the top flange is in tension due to flexure.
    c. The flexural strength computed when using C_b cannot be taken larger than the plastic moment capacity of the beam.
    d. All of the above

9. True or False: Inflection points may be treated as brace points when defining unbraced lengths.
    a. True
    b. False

10. Which of the following is correct about determining the flexural strength of a wide flange section according to the AISC *Specification*?
    a. The inelastic LTB capacity is represented by a linear transition between L_p and L_r.
    b. A maximum residual stress = 0.3 times the yield stress is assumed.
    c. Partial yielding is accounted for.
    d. All of the above.