53:134 Structural Design II (Steel Structures)

Spring 2006 (Lecture Summary)

Week 14 (4/17 - 4/21/06)

4/17/06

- Review of design for flexure.
- Design for combined bending and axial loading: beam-column.
  - ✓ Discussion of HW #16
  - ✓ Two major concepts related to combined bending and axial loading - superposition of stresses; amplification of bending moment
  - ✓ Interaction equations.
  - ✓ LRFD criteria
  - ✓ Moment amplification - basic derivation; braced/unbraced frames
  - ✓ **HW #17**: Beam design problem

4/19/06

- Design for combined bending and axial loading: beam-column.
  - ✓ Discussion of HW #17: calculation of Zx and design strength of a section for bending.
  - ✓ Review of previous lecture: interaction equations for combined axial tension/compression loading.
  - ✓ Chapter H of Specifications: Combined loading, bending about two axes; page 38.

- ✓ Chapter C of Specifications: Frames and Other Structures; page 17.
- ✓ Web local buckling in beam-column: Table B5.1 on page 16.1-14: limiting width thickness ratios for compression elements for combined loading depend on the factored axial load.
- ✓ Beam-column design: Part 6 of the Manual.
- ✓ Example of a beam column subjected to varying moment, single curvature bending.

♦ **HW #18**: Beam-Column Design.

4/21/06

♦ Design for combined bending and axial loading: beam-column.

- ✓ Review of previous lecture – relevant Manual material.
- ✓ Example: 6.1 from the Manual, Combined axial tension and bending.
- ✓ Example 6.2 from the Manual – W-shape subjected to combined axial compression and flexure (braced frame).

♦ Interaction equations in terms of b, m, n on Page 6-11 of the Manual. Values of b, m, and n are tabulated in the Manual for sections subjected to combined bending and axial compression.

♦ **Read**: Manual Part 6; Examples 1 and 2.