POSSIBLE TOPICS FOR ASEN 6367 TERM PROJECT - Spring 2009

List Compiled as of March 15, 2009

1. Develop a 4-node quadrilateral elements for axisymmetric solids that perform better in bending than the standard iso-P 4-node quadrilateral element called `Quad4` in Chapters 11-14. (That is, has less shear locking.) Methods to be considered: Selective Reduced Integration (SRI) and Hellinger-Reissner. Compare with `Quad4` and `Quad8` on thin circular plates and axisymmetric shell benchmarks.

   Flavor: Analytical + computational. Symbolic computations required for SRI model.

   Background material: Chapters 11-14. Available code: `QuadSOR`.

   Requirements: medium programming ability, physical insight

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2. Develop an optimal mass matrix for the triangular membrane element with corner drilling freedoms.

   Flavor: Analytical + computational (heavy symbolic)

   Background material: Instructor can supply.

   Requirements: some knowledge of dynamics, above average ability to program CAS

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3. Extend `QuadSOR` to do harmonic Fourier analysis in the circumferential direction. Test using a lateral point load on spherical shell moving it from pole to equator.

   Flavor: Computational (mostly numerical)

   Background material: Chapters 11-14. Code: `QuadSOR`

   Requirement: ability to do Fourier analysis in cylindrical coordinates.

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4. Extend the shell element with 24 DOF to a stack element (using MFCs to represent offset links) for composite material analysis.

   Flavor: Analytical + computational (mostly numerical)

   Background material: Instructor may supply.

   Requirement: understanding of MFCs, good programming ability, physical insight

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5. Develop a template for the 8-node solid brick element. Investigate optimal selection of higher order stiffness matrix for the rectangular geometry, using bending benchmarks.

   Flavor: Analytical + computational (mostly symbolic)

   Background material: Instructor may supply.

   Requirement: above average programming ability on a CAS.
