Instructions for Proper Term Paper Format and Content

<u>Paper/Page Layout</u>

All papers should be clearly written and word-processed using plain white 8.5” x 11” paper size with 1” margins on all sides. Avoid the use of frilly font types that are hard to read - *Times Roman* or *Arial* are preferred. Font size should be uniform through out and be in the range 10-12pt. Larger fonts may be used on the title page (see example). Text should generally be double spaced; however, single spacing may be used for: figure and table entries and captions, and reference, computer code or data listings. Pages should be numbered consecutively starting after the title page.

<u>General Content</u>

- Title Page (indicating title, student name, paper purpose, course number and name, professor name, date – see example on page 4)
- Table of Contents
- Introduction (provide background, literature review, paper purpose and contents, etc.)
- Various Internal Sections (logically divided and ordered to present the study)
- Summary and Conclusions
- List of References (either numbered in order of appearance in text or alphabetical order by last name; see referencing section)
- Appendix (optional for additional material that is of minor importance; e.g. data, computer code or parts listings, extra figures and/or tables, etc.)

Figures and Tables can either be embedded in the text immediately after they are first referenced or placed together at the paper’s end after the references.

<u>Figures</u>

All figures should be clearly readable and scaled properly to match the font size used in the text. Electronic copying or custom generation (Word Graphics, MATLAB, Excel, etc.) should allow easy manipulation of figures to accomplish proper location and sizing. Figures must include a caption (usually placed below the graphic) that contains the figure number followed by a brief description of what is shown. All figures must be explicitly discussed in the text by referencing the appropriate figure number. For papers of limited length, a simple consecutive numbering scheme can be used. An example of the text referencing and discussion along with the figure captioning is shown below.

- - FROM TEXT - -

. . . The GFEA model shown in Fig. 1 uses problem symmetry and thus analyzes only a quarter domain for the case *b/a* = 20, with *a* taken as unity. The mesh was refined around the center hole and was graded in the direction moving away from the hole toward the outer boundaries. Several meshes were tested for accuracy and convergence and the case shown was chosen for comparison with the analytical solution. Comparisons of the dimensionless tangential stress σ_θ/T are illustrated, and the results indicate a very close match between GFEA predictions and the analytical solution (shown as continuous lines). . . .

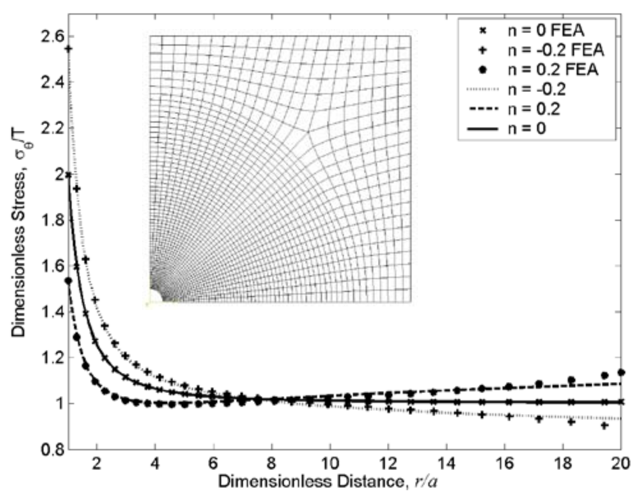

Fig. 1. Verification problem mesh geometry and stress profile comparisons.

Tables

Similar to figures, all tables should be clearly readable and scaled properly to match the font size used in the text. Electronic copying or custom generation should allow easy manipulation of tables to accomplish proper location and sizing. Tables must include a caption (commonly placed above the table) that contains the number followed by a brief description of what is shown. All tables must be explicitly discussed in the text by referencing the appropriate table number. For papers of limited length, a simple consecutive numbering scheme can be used. An example of the text referencing and discussion along with the table captioning is shown below.

- - FROM TEXT - -

. . . Furthermore, it appears that as gradation depth is increased, the stress gradient from the hole to the interior peak becomes smoother with its peak slightly inside, or at a slightly more shallow depth, than the gradation depth. This is clearly the case for n = 0.1. The results are tabulated in Table 3 for all cases evaluated. . . .

Table 3. Stress concentration results for biaxial loading.

k	*E/E_0 max*	*n*	*Depth*	*σ_θ/T max*	*σ_θ/T at hole*
-0.8	0.2	0.1	45%	1.184	0.839
		0.2	35%	1.209	0.775
		0.3	28%	1.230	0.738
		2.0	14%	1.400	0.562
-0.7	0.3	0.1	45%	1.153	1.085
		0.2	35%	1.177	1.025
		0.3	28%	1.200	0.988
		2.0	14%	1.360	0.815
-0.6	0.4	0.1	45%	1.282	1.282
		0.2	35%	1.230	1.230
		0.3	28%	1.197	1.197
		2.0	14%	1.337	1.034
-0.4	0.6	0.1	45%	1.590	1.590
		0.2	35%	1.552	1.552
		0.3	28%	1.529	1.529
		2.0	14%	1.410	1.410

Equations

Like figures and tables, equations should be clearly readable and scaled properly to match the font size used in the text. Electronic copying or custom generation (use Word Equation Editor) should allow easy manipulation of equations to accomplish proper location and sizing. Equations are normally centered in an open space in the text and should include a number (normally placed in parentheses to the right of the equation). All equations should be discussed or referenced in the text by quoting the appropriate equation number. For term papers of limited length, a simple consecutive numbering scheme can be used. An example of proper equation formatting and referencing is shown below.

Using Cartesian coordinate formulation in the x,y-plane, the compatibility equation for the plane stress problem of linear elasticity can be written as

$$\frac{\partial^2}{\partial x^2}\left(\frac{1}{E}\frac{\partial^2\phi}{\partial x^2}-\frac{\nu}{E}\frac{\partial^2\phi}{\partial y^2}\right)+\frac{\partial^2}{\partial y^2}\left(\frac{1}{E}\frac{\partial^2\phi}{\partial y^2}-\frac{\nu}{E}\frac{\partial^2\phi}{\partial x^2}\right)+2\frac{\partial^2}{\partial x\partial y}\left(\frac{1+\nu}{E}\frac{\partial^2\phi}{\partial x\partial y}\right)=0 \qquad (1)$$

where E is the elastic or Young's modulus, ν is Poisson's ratio and ϕ is the usual Airy stress function . . . Equation (1) represents the governing equation in the terms of the stress function.

Referencing

All sources of information used to develop the paper should be properly referenced. This means that the paper should contain a method of linking text information to the sources from which it came. Two common format methods exist of doing this, and your paper should consistently use one of them. The first scheme uses the reference author's last name and date in the text which is then linked to the corresponding item in the list of references which is in alphabetic order. An example of this scheme is shown below.

- - FROM TEXT - -
. . . Closed-form, analytical solutions for graded materials provide important verification problems for computational modeling, and recent papers developing *graded finite element analysis* (Santare and Lambros, 2000); (Kim and Paulino, 2002); and (Butlar et al., 2006) indicate growing interest in this area. . . .

LIST OF REFERENCES
Buttlar, W.G., Paulino, G.H., Song, S.H., 2006. Application of Graded Finite Elements for Asphalt Pavements, J. Eng. Mech., Vol. 132, 240-249.
Chan, A.M., Horgan, C.O., 1998. End Effects in Anti-Plane Shear for an Inhomogeneous Isotropic Elastic Semi-Infinte Strip, J. Elasticity, Vol. 51, 227-242.
Clements, D.L., Kusuma, J., Ang, W.T., 1997. A Note on Antiplane Deformations of Inhomogeneous Elastic Materials, Int. J. Eng. Sci., Vol. 35, 593-601.
Delale, F., Erdogan, 1983. The Crack Problem for a Nonhomogeneous Plane, J. Appl. Mech., 50, 609-614.
Dhaliwal, R.S., Singh, B.M., 1978. On the Theory of Elasticity of a Non-Homogeneous Medium, J. Elasticity, Vol. 8, 211-219.
Fraldi, M., Cowin, S.C., 2004. Inhomogeneous Elastostatic Problem Solutions Constructed from Stress-Associated Homogeneous Solutions, J. Mech. Physics Solids, Vol. 52, 2207-2233.
Gibson, R.E., 1967. Some Results Concerning Displacements and Stresses in a Non-Homogeneous Elastic Half Space, Geotechnique, Vol. 17, 58-67.
Kim, J.H., Paulino, G.H., 2002. Isoparametric Graded Finite Elements for Nonhomogeneous Isotropic and Orthotropic Materials, J. Appl. Mech., Vol. 69, 502-514.
Miyamoto, Y., Kaysser, W.A., Rabin, B.H., Kawasaki, A., Ford, R.G., 1999. Functionally Graded Materails: Design, Processing and Applications, Kluwer Academic, Dordrecht.
Sadd, M.H., 2009. Elasticity Theory, Applications and Numerics, second ed., Academic Press/Elsevier, Boston.
Sankar, B.V., 2001. An Elasticity Solution for Functionally Graded Beams, Composites Science and Technology, Vol. 61, 689-696.
Santare, M.H., Lambros, J., 2000. Use of Graded Finite Elements to Model the Behavior of Nonhomogeneous Materials, J. Appl. Mech., Vol. 67, 819-822.

A second method uses a consecutive numbering scheme starting at [1] in the text which is then linked to a corresponding item in a numbered list of references as demonstrated with the same previous material in the example below. Note that this scheme uses a non-alphabetized list.

- - FROM TEXT - -
. . . Closed-form, analytical solutions for graded materials provide important verification problems for computational modeling, and recent papers developing *graded finite element analysis* [1], [2] and [3] indicate growing interest in this area. . . .

LIST OF REFERENCES
[1] Santare, M.H., Lambros, J., 2000. Use of Graded Finite Elements to Model the Behavior of Nonhomogeneous Materials, J. Appl. Mech., Vol. 67, 819-822.
[2] Kim, J.H., Paulino, G.H., 2002. Isoparametric Graded Finite Elements for Nonhomogeneous Isotropic and Orthotropic Materials, J. Appl. Mech., Vol. 69, 502-514.
[3] Buttlar, W.G., Paulino, G.H., Song, S.H., 2006. Application of Graded Finite Elements for Asphalt Pavements, J. Eng. Mech., Vol. 132, 240-249.
[4] Sankar, B.V., 2001. An Elasticity Solution for Functionally Graded Beams, Composites Science and Technology, Vol. 61, 689-696.
[5] Chan, A.M., Horgan, C.O., 1998. End Effects in Anti-Plane Shear for an Inhomogeneous Isotropic Elastic Semi-Infinte Strip, J. Elasticity, Vol. 51, 227-242.
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All entries in the Reference List must be cited in the text and vice versa.

(Example Title Page)

A Review of Anisotropic Elasticity

James Smith

Project Report for

MCE 571 Theory of Elasticity I

Professor M. H. Sadd

May 2010