



**Illinois Society of Professional Engineers - University of Illinois
College of Engineering
Professional Engineer On-Line Seminar Series**



INSTRUCTIONS:

1. View the on-line seminar.
2. Complete the quiz below.
3. Complete the "Engineer Information" section.
4. Make a copy for your records.
5. Mail the quiz along with your \$20 payment (credit card information or check payable ISPE) to:
ISPE, 100 East Washington Street, Springfield, IL 62701.

If you score an 80% or better on the quiz, you will receive your certificate within 4 weeks. If you fail to earn an 80% score, the quiz will be returned to you and you will have the opportunity to retake it.

Each seminar/quiz is worth 1 Professional Development Hour.

QUIZ: 04-12
TOPIC: Overview and Applications of Generalized Finite Element Methods
PRESENTER: Prof. C. Armando Duarte

1. Generalized FEM was originally developed in order to solve problems of highly oscillatory solutions.
(circle) TRUE FALSE
2. The Extended FEM developed by Belytschko is mathematically not equivalent to GFEM.
(circle) TRUE FALSE
3. Galerkin method picks the possible best of all the combinations of the finite element shape functions.
(circle) TRUE FALSE
4. GFEM uses the partition of unity clustered shape functions to a single node for nonmatching mesh.
(circle) TRUE FALSE
5. Automatic mesh generators always provide and guarantee a good mesh.
(circle) TRUE FALSE
6. FEM shape functions do not have the partition of unity property.
(circle) TRUE FALSE
7. GFEM shape functions are generated by
 - a) Dividing the partition of unity shape functions by enrichment functions.
 - b) Multiplying the partition of unity shape functions by enrichment functions.
 - c) Simply adding the partition of unity shape functions with enrichment functions.
 - d) All of the above.
8. Enrichment functions must be
 - a) Polynomials
 - b) Trigonometric functions.
 - c) Discontinuous functions.
 - d) Functions, which represent the local phenomena of the problem.

QUIZ 04-12 CONTINUED

9. GFEM can solve problems when elements have
- a) Only positive jacobians
 - b) Both positive and negative jacobians.
 - c) Only if the value of the jacobians is 1/2.
 - d) Only negative jacobians.
10. In GFEM, using the discontinuous enrichment functions,
- a) crack problems can be solved with regular mesh.
 - b) A refined mesh around the crack is necessary.
 - c) crack-tip elements are necessary with no mesh refinement for crack problems.
 - d) No mesh is required at all.
11. If the partition of unity and the enrichment functions are polynomials,
- a) The resulting stiffness matrix can not be singular.
 - b) The resulting stiffness matrix will be singular in general.
 - c) The system of equations will be linearly dependent.
 - d) None of the above.

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