



Illinois Society of Professional Engineers - University of Illinois  
College of Engineering  
Professional Engineer On-Line Seminars



**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:  
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Each seminar/quiz is worth 1 Professional Development Hour.

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**QUIZ:** 04-15  
**TOPIC:** Quasibrittle Size Effect and Its Role in Structural Reliability Concepts for Design Codes  
**PRESENTER:** Prof. ZDENĚK P. BAŽANT

1. For structures, what is normal failure type
  - a) Plastic.
  - b) Brittle.
  - c) Quasibrittle.
  - d) All of the above.
2. Which of the following is quasibrittle material
  - a) Concrete.
  - b) Rocks.
  - c) Wood.
  - d) Cast iron.
  - e) All of the above.
3. Considering size effect, the average safety factor for small and large structures will be different, and that for large structures is smaller.  
(circle) TRUE FALSE
4. Leading to the sunk Sleipner A Platform Norway, which sank on Aug 23, 1991, how much is the  $f_t$  reduced due to size effect
  - a) 25%
  - b) 15%
  - c) 40%
  - d) 50%
5. There are two causes of size effect: Energetic – energy release due to stress redistribution; Statistical – random material strength.  
(circle) TRUE FALSE
6. What could be the option to remedy misleading covert understrength factor in codes
  - a) Use mean prediction formulae and mean material strength. In addition to current understrength factor  $\phi$ , account for  $\phi_f$  for formula error and  $\phi_m$  for material uncertainties.
  - b) Keep current formula and reduced strength, specify implied understrength factors  $\phi_f$  and  $\phi_m$  with c.o.v and probability cut-offs.
  - c) Both of the options are OK.
7. Energetic (Quasibrittle) Mean Size Effect Laws have same expressions for different cohesive crack models.  
(circle) TRUE FALSE

## QUIZ 04-15 CONTINUED

8. What is appropriate for analysis of failure probability in Nonlocal Weibull Theory
- Use Gaussian distribution as central portion with grafted Weibull Tail.
  - Use Weibull distribution as central portion with Gaussian Tail.
  - Use Gaussian distribution for all situations.
  - Use Weibull distribution for all situations.
9. For the cause of failure of Malpasset Dam, how much should the tolerable movement of abutment be smaller today
- |         |         |
|---------|---------|
| a) 40%. | b) 51%. |
| c) 65%. | d) 33%. |
10. In which of following disasters, there have been size effects as contributing factors
- Collapse of St. Francis Dam, 1928
  - Collapse of Schoharie Creek Bridge, N.Y., Thruway, 1987
  - Kobe Earthquake 1995, Hanshin Viaduct
  - Cypress Viaduct 1989, Nimitz Freeway, Oakland, CA
- The answer should be:
- |                 |                    |
|-----------------|--------------------|
| a) I, II.       | b) I, III.         |
| c) II, III, IV. | d) I, II, III, IV. |
11. Considering the size effect and probabilistic concepts, we should increase the overall individual safety factor  $\Phi$  for all structures and failure types in the future codes.  
(circle) TRUE FALSE
12. For the future code, there will be articles about following topics:
- Torsion of beams
  - Shear of deep beams
  - All failures due to compression crushing of concrete
  - Precast concrete connections
- Which of them should consider size effects:
- |                    |                |
|--------------------|----------------|
| a) II, IV.         | b) I, III.     |
| c) I, II, III, IV. | d) I, III, IV. |

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## ENGINEER INFORMATION

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