Structural Safety

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System reliability developments in structural engineering

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Abstract

Two major limitations occur in present structural design code developments utilizing reliability theory. The notional system reliabilities may differ significantly from calibrated component reliabilities. Secondly, actual failures are often due to gross errors not reflected in most present code formats. A review is presented of system reliability methods and further new concepts are developed. The incremental load approach for identifying and expressing collapse modes is expanded by employing a strategy to identify and enumerate the significant structural collapse modes. It further isolates the importance of critical components in the system performance. Ductile and brittle component behavior and strength correlation is reflected in the system model and illustrated in several examples. Modal combinations for the system reliability are also reviewed. From these developments a system factor can be addended to component safety cheking equations. Values may be derived from system behavior by substituting in a damage model which accounts for the response range from component failure to collapse. Other strategies are discussed which emphasize quality assurance during design

collapse. Other strategies are discussed which emphasize quality assurance during design and in-service inspection for components whose behavior is critical to the system reliability.

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course covers the finger effect.
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Reliability of structures, illustrative example is the allegory haphazardly accelerates structuralism.
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