ECCS course « Fatigue Design Of Steel And Composite Structures »


Speakers:  
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<th>Date</th>
<th>Topic</th>
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<td>DAY 1</td>
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| 10-11AM    | Introduction                       | - Content, objectives  
- Logic of the book and of the lectures  
- Structures at risk, examples of cracking | Must follow ECCS manual logic, at least for some regrouping of topics.  
Inclusion of design examples within lectures |
| 11AM-1PM   | Basis of fatigue design            | - Concept of S-N curves, main parameters  
- S-N curves: experimental determination, definitions of stress range and nb of cycles  
- Terminology (in relation to Eurocodes)  
- Variable amplitude, damage sum and equivalent damage concept | Introduce main concepts to put all participants at same min. level of understanding. |
| 2-4PM      | Basis of fatigue design (cont.)    | - Variable amplitude, damage sum and equivalent damage concept (cont.)  
- Verification methods (with stress ranges, with nb. of cycles, with damage sum) | Exo damage sum calculation |
| 4-6PM      | Codes of practice                  | - Different existing codes: Eurocodes, IIW, DNV, …  
- Separation between action effects and resistance  
- Application and limitation range: materials, corrosion  
- Fabrication and quality assurance, EXC classes | Show where information can be found, also outside of Eurocodes, similarities between all codes.  
Sensitization wrt fabrication (EN 1090-2) |
| DAY 2      |                                    |                                                                         |                                                                                                  |
| 9AM -1PM   | Actions and action effects         | - Fatigue loads, fatigue load models (general)  
- Road bridges load models (FLM1 to FLMS), railroad models (UIC 71, …)  
- Service life, new vs existing bridges  
- Damage equivalent factors, « span » or critical length, simultaneity (multiples charges)  
- Combination road and railway traffic | Go beyond strict application of Eurocodes, consider practical questions often asked |
| 2 – 6PM    | Determination of stresses and stress ranges | - Calculation of stresses: nominal, modified nominal, geometric  
- Calculation of stress ranges: in bolted, welded connections, multiaxial cases  
- In steel-concrete composite bridges | Exo determination of stress in bolted detail, in welded detail |
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<th>AM - 1PM</th>
<th>Fatigue strength and detail categories</th>
<th>Safety and design methods</th>
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<tr>
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<td>- Catalogue of construction details</td>
<td>- Steel quality choice: link between fatigue and brittle fracture (EN 1993-1-10)</td>
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<td>- Classification by identification, by analogy</td>
<td>- Design methods: safe life, damage tolerant</td>
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<td>- Fatigue strength modifications: size effect, mean stress and residual stresses,</td>
<td>- Partial factors for fatigue determination</td>
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<td>- Hot spot stress method for fatigue design</td>
<td>- Evolution of reliability index during life wrt fatigue, influence of inspections, inspection interval determination</td>
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<td>- Special details: orthotropic plates, tension elements (EN1993-1-11), reinforcing steel (EN1992-2)</td>
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<td>2 - 5PM</td>
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<td>Exo verification of a detail in a bridge</td>
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Exo detail classification

Exo verification of a detail in a bridge