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Tuesday 17 November 2020 12.00 GMT (13.00 CET)

APPLICATIONS OF LAYOUT OPTIMIZATION IN ENGINEERING ANALYSIS AND DESIGN

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ABSTRACT

To verify the safety of structural and geotechnical constructions against collapse, engineers have traditionally had to rely either on simplistic hand type calculations, or on significantly more complex computational tools that identify the collapse state in an indirect, iterative, manner - which can be costly in terms of computer and operator time. Additionally, in many engineering disciplines the initial design stage is carried out in an ad-hoc manner, with engineering intuition often used to identify structurally efficient designs. So-called 'direct methods' can potentially address both these issues, and similarities between analysis and design formulations can also potentially be exploited. One such direct method, numerical layout optimization, will be the focus of this presentation. Layout optimization will be described and then applied both to structural design problems and to the problem of identifying the critical layout of discontinuities in a range of structural and geotechnical constructions at the point of collapse.

SPEAKER BIO

Matthew is Director of the Integrated Civil and Infrastructure Research (ICAIR) Centre at the University of Sheffield, where he is also a Professor in the Department of Civil and Structural Engineering. He has a longstanding interest in application of optimization techniques to engineering analysis and design problems. He works closely with industry and co-founded the engineering software company LimitState to make methods developed in his research accessible to practitioners; the company currently has industry customers in more than 30 countries worldwide. He is also currently Chair and Honorary Editor of the Engineering and Computational Mechanics journal published by the Institution of Civil Engineers and is a Review Editor of the Structural and Multidisciplinary Optimization journal published by Springer Nature.

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