# Article information:

混凝土的细观研究II：非线性有限元分析 - ScienceDirect  
<https://www.sciencedirect.com/science/article/pii/S0045794998001783>

# Article summary:

1. This paper presents a nonlinear finite element method for mesoscopic analysis of concrete, which takes into account the interaction between various components of concrete.

2. Three major difficulties in applying the nonlinear finite element method to mesoscopic studies are discussed: (1) stress concentrations near crack tips; (2) only one element is allowed to crack at each iteration; and (3) numerical instability when the structure enters into the post-peak range.

3. A cracking criterion combining tensile strength and fracture toughness is adopted, an incremental direct iteration procedure with loads applied under displacement control and secant stiffness used in the analysis is employed to overcome these difficulties.

# Article rating:

May be slightly imbalanced: The article presents the information in a generally reliable way, but there are minor points of consideration that could be explored further or claims that are not fully backed by appropriate evidence. Some perspectives may also be omitted, and you are encouraged to use the research topics section to explore the topic further.

# Article analysis:

The article provides a detailed overview of a nonlinear finite element method for mesoscopic analysis of concrete, taking into account the interaction between various components of concrete. The authors discuss three major difficulties in applying this method to mesoscopic studies, and propose solutions such as a cracking criterion combining tensile strength and fracture toughness, an incremental direct iteration procedure with loads applied under displacement control, and secant stiffness used in the analysis.

The article appears to be reliable overall, as it provides detailed information on how to apply the nonlinear finite element method to mesoscopic studies of concrete. The authors provide evidence for their claims by citing previous research papers that have been conducted on this topic. Furthermore, they provide clear explanations for why certain methods are being proposed as solutions to the difficulties discussed in the article.

However, there are some potential biases that should be noted when considering this article's trustworthiness and reliability. For example, while the authors cite previous research papers related to this topic, they do not explore any counterarguments or alternative perspectives that may exist within those papers or other sources related to this topic. Additionally, while they provide evidence for their claims regarding how best to apply this method to mesoscopic studies of concrete, they do not present any evidence regarding its effectiveness or accuracy when applied in practice. Finally, it should also be noted that while they discuss potential risks associated with using this method for mesoscopic studies of concrete, they do not provide any specific guidance on how those risks can be mitigated or avoided altogether.

# Topics for further research:

* Mesoscopic analysis of concrete
* Nonlinear finite element method
* Cracking criterion for concrete
* Incremental direct iteration procedure
* Secant stiffness in analysis
* Mitigating risks of mesoscopic studies of concrete

# Report location:

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