

Cover cracking model in reinforced concrete structures subject to rebar corrosion

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Key objective

Obtain the predicting model of cover cracking time and parameter analysis of corrosion problem

Key methodology

In this study, anisotropic damage constitution of concrete, the steel rebar and the mechanical properties of rust can be fully taken into account. At the same time, the influences of the steel-concrete interface pores and the cracks in concrete on the rust expansion pressure value are modeled. Finally, some experiments are made for comparison with the analytical results.

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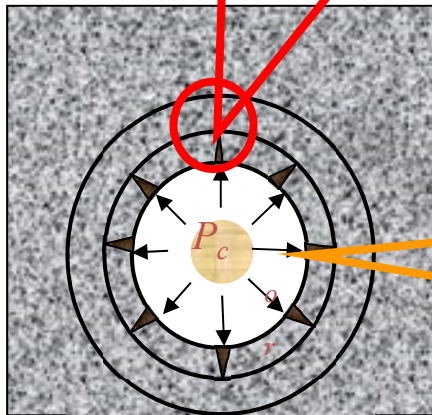


Advantage of proposed model

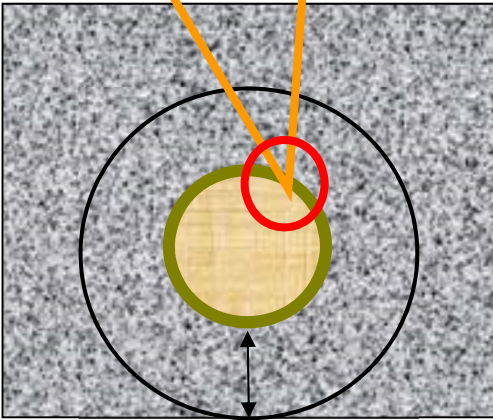


Anisotropic damage caused by
Multiaxial stresses

Steel-Rust-Concrete three phase

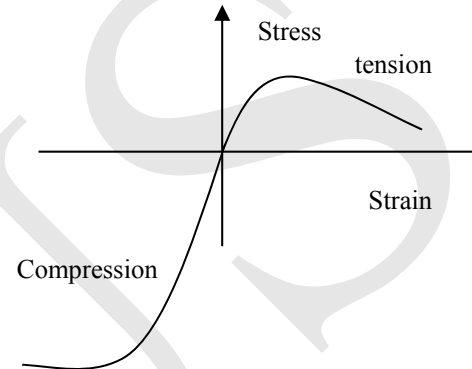


Rust filling(three)

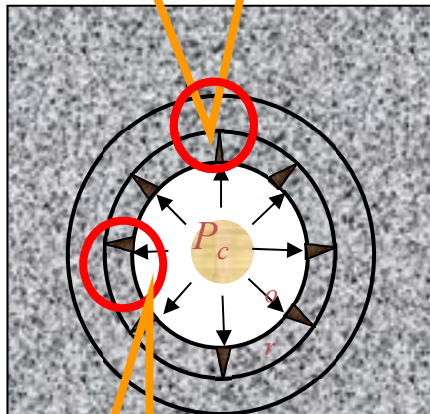


Advantage of proposed model

Why anisotropic damage is adopted??



Anisotropic damage caused by Multiaxial stresses



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- Failure mechanism ---- multiaxial stress not uniaxial stress (Damage caused by tension, which is induced by compression, so anisotropic damage happen)
- Same position—different behavior for tension and compression

Anisotropic damage theory (handle it)

Key conclusions

- It can be seen that pressure is not a good indicator for describing the degree of damage of cover concrete. However, the inner hoop strain or outer hoop strain can be used as good indicators.
- When the crack occurs, the corrosion rust will penetrate into the crack, and the increasing velocity of hoop strain will decrease.
- When the type and diameter of steel, and strength of concrete are chosen, the risk of cover cracking decreases with increasing the ratio of cover thickness to steel diameter (C/D_{st}).