Modelling corrosion induced cracking in reinforced concrete

Xia Li (2059608l@student.gla.ac.uk)

**Supervisor: Dr. Peter Grassl**

The analytical solutions are modeled in Matlab by the loops of \( R_c \) and radial coordinate. However, nonlinear ordinary differential equation cannot find the general solutions, which can solved the boundary values in Matlab with ‘pbr4c’ [3].

- Figure 2 shows the cracking front has little influence on those uncracked concrete that far away to some extent. The uncracked concrete has smaller tangential stress than the cracked concrete around the cracking front.
- Figure 3 indicates the radial stress at inner surface of cover concrete is increased as corresponding radial displacement increased until radial stress reach a critical point.
- Figure 4 indicates that the thicker cover concrete has the larger capacities of critical radial stress and radial displacement. In addition, the thicker cover concrete would lead to the larger radial stress at inner surface.
- Figure 5 presents that the increasing \( \varepsilon_f \) can lead to larger radial stress at inner surface.

**Conclusions**

- Analytical solutions of divided thick-walled cylinder are found from ordinary differential equations by substituting corresponding boundary conditions.
- Modelling of stresses and strains of cracking processes indicate that increasing thickness and \( \varepsilon_f \) can all lead to larger radial stress at inner surface.

**References**