

# **Fatigue of concrete in the presence of a crack**

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## **Abstract**

This thesis deals with the application of fracture mechanics principles to study the rate of crack propagation in plain concrete. The laws of fatigue crack propagation may be used to predict life in concrete structures. The work can be divided into two parts. In the first part, experimental investigation is conducted to check the validity of Paris' Law ( $da/dN=C(\Delta K)^m$ ) for fatigue crack growth rate in plain concrete. The values of 'C' and 'm' for different cycle ratios 'R' are determined. The data are also checked with an expression similar to Paris' law which also includes the effect of different cycle ratios.

In the second part, two concrete repair techniques are evaluated by comparison with the results obtained in the first part of the work. For all experimental investigation, "long", notched concrete beams were used. The beam specimen's dimensions were chosen so as to induce a stable mode I fracture. Crack propagation lengths of up to about 70mm could be accommodated by the specimen.