Design criteria for crack control in RC liquid retaining structures

Congratulations to Mr N. Srinivas and Dr Devdas Menon for their really informative article titled "Design criteria for crack control in RC liquid retaining structures - Need for a revision of IS: 3370 (Part II) - 1965," published in the August 2000 issue.

It brought out the deficiencies in the steel design of liquid retaining RC structures as per the existing IS 3370 (Part II) and the shortcomings for similar design in the relevant ACI (350 R) and BS codes (5337).

Some of the calculations and observations in support may however require a relook. For example the authors state on pp. 453 "A parametric study has shown that for a given value of p_t, the crack width, *w, (corresponding* to the allowable moment capacity, *M*) increases with increase in *D* and f_{ck}, and decreases with increase in *c* and *s*.

The Gergely-Lutz formula is as follows

$$w = 0.0132\left(\sqrt[3]{t_b A}\right)\frac{(D-x)}{(D-x)}\left(f_s - 34.5\right)\times 10^{-3}$$

This equation shows that if clear cover *c* increases t_b will also increase in most of the cases and *d* will decrease unless there are more than one row of steel on the tensile side and it is possible to do adjustment in their positions without changing their centre of gravity. This will mean a higher value of *(D-d)* giving a higher value of *A*. Further *(d-x)* will in most of the cases decrease as *x* will remain almost same or its change will be much less compared to *d*. The cumulative effect of all these will be an increase in the value of *w*, f_s remaining constant. Similarly increasing spacing, *s*, means increasing the diameter of the rod, for the same value of f_s. Thus increasing *c* and *s* should give more width of crack and not less, will the authors clarify this doubt?

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The authors reply :

We thank Mr Singha Roy for his valuable comments. As rightly pointed out, increased cover and increased spacing contribute to increase in flexural crack widths. However, the intention of the parametric study was to locate the extreme values of the various crack widths parameters (*D*, *c*, *s* and f_{ck}) that result in upper and lower bound values of the normalised moment capacity ($M/f_{ck}bD^2$). Increased cover, for example, results in a lower value of $M/f_{ck}bD^2$.

The authors are obliged to Mr Singha Roy for enabling them to make this clarification. In view of this observation, it would have been more appropriate to use the phrase, "parameters contributing to small/large normalised moment capacities", in lieu of "parameters contributing to small/large crack widths" in the text of the paper.

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