



Research article

Shear crack control for a reinforced concrete T-beam using coupled stochastic-multi-objective optimization methods

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Supplementary

$$\begin{aligned}
E23 = & 0.00082465752886651255693095663446001708507537841796875 + 0.00000000354207200 \\
& 105899236257378515091431836481206119060516357421875X_1 - 0.00000000000002621021 \\
& 49734023888944796334729466178592319561269086136690021X_2 + 0.00000000130244495681 \\
& 716872248490091124040191061794757843017578125X_3 - 0.00000000000000266684485330010 \\
& 303726180875368402542285005407673992294803611X_4 - 0.00000000000001851290333896 \\
& 11389376398992503980345247782679507508873939514X_1^2 + 0.000000000000000000000002 \\
& 7862973434644027535585267301475338501713160475510527540666X_2^2 - 0.000000000000007 \\
& 4207096730382721174444117517854380139397107996046543121337X_3^2 + 0.0000000000000 \\
& 00000000000000134191554758707613284769848309303535478772279548346519197672X_4^2 - \\
& 0.00000000000000000054086325023614641054810533841890685483087360413885930901165 \\
& X_1X_2 + 0.000000000000000000637832840754316011101324333475554595756657023719127 \\
& 588834432X_1X_3 - 0.000000000000000000057662486099672332276805568142187924120 \\
& 6154893583207737746974X_1X_4 - 0.000000000000000000020372460757921914803635448 \\
& 1577862697946110493230554324399105X_2X_3 + 0.0000000000000000000000000041179372 \\
& 5505028817185798885715530565356339736193347046369953X_2X_4 - 0.0000000000000000 \\
& 000000218351209599369138441301815339657880628598415252396649942778X_3X_4
\end{aligned}$$

$$\begin{aligned}
U2 = & 0.0064117182696364 + 0.0000000560697971247321X_1 - 0.000000000000169990474157 \\
& 913X_2 + 0.0000000293373549381699X_3 - 0.00000000000000736704314565631X_4 - 0.0000000000 \\
& 00432677214698533X_1^2 + 0.000000000000000000000001492704X_2^2 - 0.000000000000172 \\
& 926556857095X_3^2 + 0.00000000000000000000000000003301X_4^2 - 0.000000000000000000 \\
& 698870249361X_1X_2 - 0.0000000000000000011962322356378X_1X_3 - 0.0000000000000000 \\
& 0000029438561822X_1X_4 - 0.00000000000000000026076969708X_2X_3 + 0.0000000000000000 \\
& 000000120241X_2X_4 - 0.00000000000000000001105860680X_3X_4
\end{aligned}$$



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