

# Plastic mechanism analysis of CHS stub columns strengthened using CFRP

**M. Elchalakani**

*Victoria University, Melbourne, Australia*

**M.R. Bambach**

*Monash University, Melbourne, Australia*

---

## ABSTRACT

*This paper presents a plastic mechanism analysis for circular hollow section (CHS) tubes strengthened using carbon fiber reinforced polymer (CFRP) deforming in an axi-symmetric (elephant foot) collapse mode under large deformation axial loading. The collapse proceeded progressively by folding about three concentrated hinge lines and hoop extension of the shell. An expression for the plastic collapse axial load was obtained by equating the total energy absorbed in bending and extension to the external work carried out during deformation of the tube. The newly derived mathematical model takes into account the contribution of the CFRP towards energy absorption during collapse. Comparisons of the predicted instantaneous post-buckling collapse loads with those obtained from experiments carried out elsewhere show good agreement.*

---