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Spotlight on *Structures*

Editor's Featured Articles

The Featured Articles for Volume 71 and 72 of *Structures* are now available. Associate Editor, Elyas Ghafoori, has chosen a study on a novel segmental column system for Volume 71 while Associate Editor, Yao Chen, has selected a paper on the deployment of hollow-rope tensegrity utility bridges for Volume 72.

These articles are available to read free of charge.

Volume 71

Self-centering and energy dissipation behaviour of Fe-SMA prestressed segmental column systems

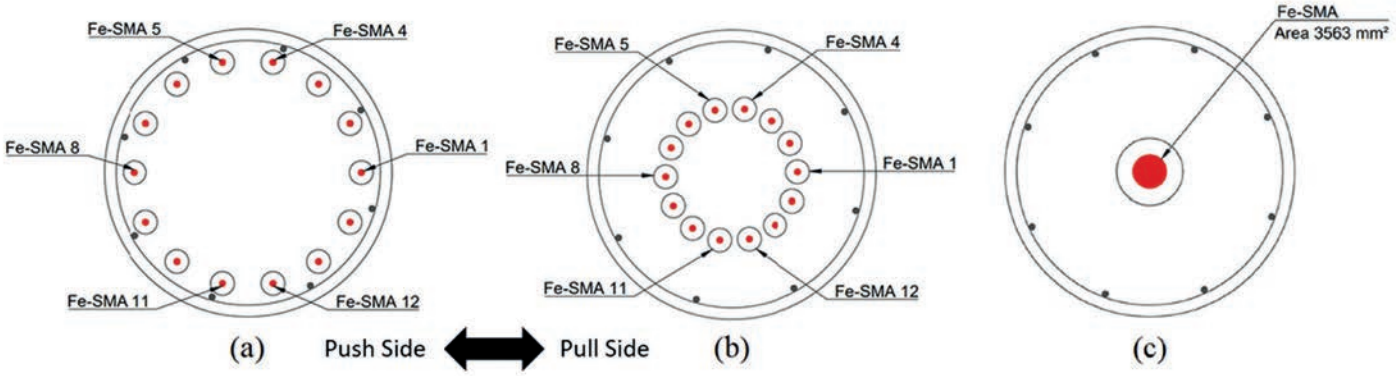
Mohammad Esmaelian[a], Saim Raza[b], Mohammad Shekarchi[a], Masoud Motavalli[a,b] and Moslem Shahverdi[a,b]

[a] School of Civil Engineering, University of Tehran, Tehran, Iran

[b] Empa, Swiss Federal Laboratories for Materials Science and Technology, Dübendorf, Switzerland

Major seismic events can result in large residual displacements in conventional monolithic bridge columns, causing serviceability problems and expensive repair costs. In contrast, post-tensioned segmental columns exhibit low residual drifts. However, such structures have limited energy dissipation capacity and require heavy mechanical equipment for prestressing using conventional tendons. This study proposes a novel segmental column system where prestressing is achieved by iron-based shape memory alloy (Fe-SMA) bars. A 3D finite element (FE) model was developed to evaluate the seismic performance of the proposed column system. The model incorporated the experimentally validated material behaviour of activated Fe-SMA bars under tension-compression reversals, which is currently lacking in the state-of-the-art. The validated model was used to conduct a parametric study to investigate the effect of several unexplored parameters on the self-centering and energy dissipation behaviour of the Fe-SMA prestressed segmental columns, which could contribute to their optimal design. The parameters included total axial load ratio, amount of prestressing, ratio of energy dissipating (ED) bars to Fe-SMA bars, and position of Fe-SMA bars in the column cross-section. The results indicate that whilst the equivalent viscous damping ratio (EVDR) is typically in the range of 5–6% for conventional segmental columns, the Fe-SMA prestressed segmental columns showed an EVDR higher than 10%, indicating a strong energy dissipation behaviour. The paper concludes by evaluating the applicability of the existing self-centering criteria to Fe-SMA prestressed columns.

→| Read the full paper at **https://doi.org/10.1016/j.istruc.2024.108127**



Volume 72

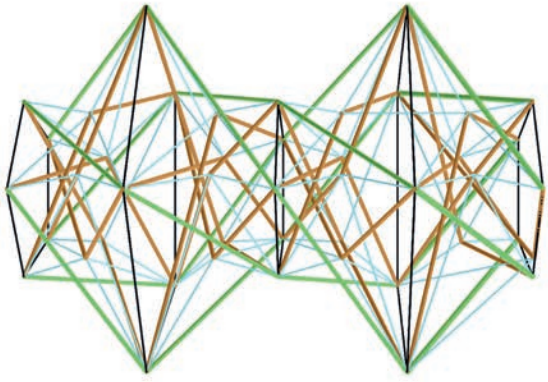
Robust Genetic Algorithm-based deployment of a hollow-rope tensegrity utility bridge

Sumit Kumar and Subhamoy Sen
i4S Laboratory, Indian Institute of Technology Mandi, Mandi, India

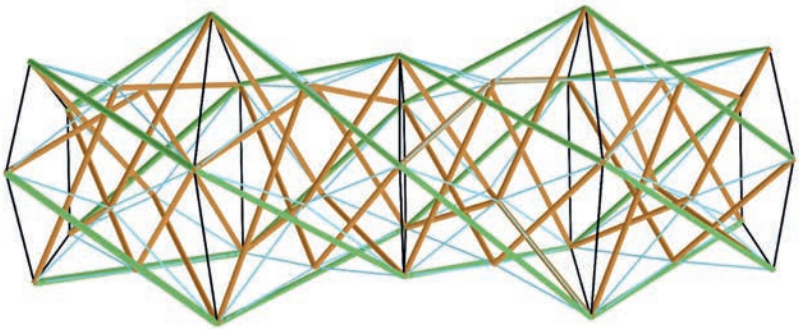
Tensegrities are renowned for their compact lightweight design, modular scalability, and efficient space utilisation, making them ideal for deployable applications. Prioritising energy efficiency, this research presents an optimised deployment strategy for tensegrity utility bridges, addressing key deployment challenges, such as local and global buckling, cable entanglement, and strut collision during deployment and post-deployment performance under in-service loading. A novel Genetic Algorithm (GA)-based approach is developed to optimise both telescopic and non-telescopic deployment methods for tensegrity structure, with the choice of deployment strategy determined by geometric constraints specific to the deployment location.

To address the challenges of achieving stable and controlled deployment, the strategy employs simultaneous actuation of all modules through cable-driven deployment. A multi-constraint GA optimisation is employed to determine the node positions while adhering to spatial constraints and ensuring self-equilibrated geometry. The proposed cable-mode actuation method helps maintaining self-equilibrated geometry while preventing strut collisions or abrupt cable actuation risking cable snapping, ensuring a safe and efficient deployment process. Numerical experiments on a 'hollow rope' tensegrity validate the proposed methodology by determining deployment paths, optimising actuation effort, and assessing safety and serviceability under typical service loading conditions. The results highlight the practical potential of the developed methodology for real-world applications.

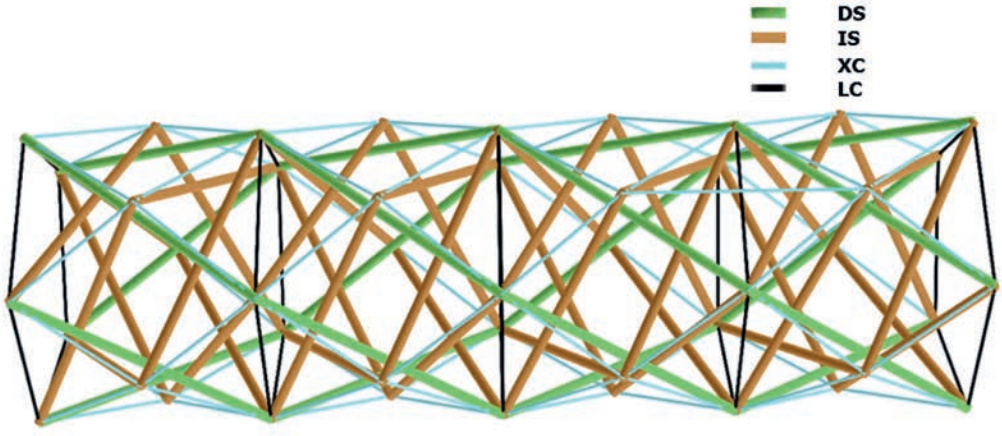
→| Read the full paper at **https://doi.org/10.1016/j.istruc.2024.108179**



(a) Folded configuration



(b) Partially deployed configuration



(c) Fully deployed configuration

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