



Fig. 12: SW and WFW of the fully restrained cable robot driven by twelve independent cables.

TABLE II: Comparing the SW and WFW of the cable-driven robots.

Type of the cable robot		SW/Ctr	WFW/Ctr
Suspended with:	Three cables	0.4469	0.0107
	Three differentials	0.5263	0.0855
	Nine cables	0.9054	0.3487
Fully restrained with:	four cables	0.1583	0.0426
	four differentials	0.1987	0.1163
	twelve cables	0.5443	0.3472

driven cable manipulator can be used in different fields such as manipulation, rehabilitation, cargo, and space robots.

V. CONCLUSIONS

In this paper, spatial cable differentials were presented and their properties compared with common independently actuated cables. Their atypical force distribution was first described. Then, two cable robots either suspended or fully restrained with a similar single-point MP were introduced and driven by respectively three and four $q = 3$ spatial differentials. The SW and WFW of these robots were then compared with four more classically driven robots. The results revealed that by replacing a single cable with a spatial differentials both types of workspaces can be improved.

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