A thermal boundary control method for a flexible thin disk rotating over critical and supercritical speeds

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Table 1 Numerical model validation using the natural frequency for a free rotating disk

Parameters	Disk mode	Current work (Hz)	ANSYS Workbench (Hz)
Disk rotating speed Ω=0 rpm Shaft temperature increment Θ_D=20 K	(0,0)	34.0345	33.798
	(0,1)	50.5412	50.412
	(0,2)	109.7484	109.76
	(0,3)	207.2632	207.18
	(0,4)	336.1603	335.87
	(1,0)	373.3374	373.07
	(1,1)	410.6060	410.12
	(0,5)	494.7116	494.11
	(1,2)	531.5171	530.62
Disk rotating speed Ω=6000 rpm Shaft temperature increment Θ_D=60 K	(0,0)	55.4631	55.054
	(0,1)	113.6046	113.39
	(0,2)	213.0075	213.07
	(0,3)	331.9636	331.99
	(1,0)	400.9092	400.36
	(1,1)	452.7148	452.13
	(0,4)	472.9953	472.85
	(1,2)	604.6028	603.31
	(0,5)	639.0490	638.61