

Table S4. List of TMD simulations performed and analyzed in the current study.

TMD simulations	Cycling period (ps)	Frequency (f_o) (ns^{-1})	Frequency ^(a) (w_o) (rad/ns)	Total simulation period ^(b) (ns)
TMD ₁	5000	0.200	1.26	80.0
TMD ₂	2000	0.500	3.14	32.0
TMD ₃	1200	0.833	5.23	19.2
TMD ₄	800	1.25	7.9	12.8
TMD ₅	500	2.00	12.6	8.00
TMD ₆	350	2.86	17.9	5.60
TMD ₇	200	5.00	31.4	3.20
TMD ₈	150	6.67	41.9	2.40
TMD ₉	100	10.0	62.8	1.60
TMD ₁₀	70	14.3	89.7	1.12
TMD ₁₁	50	20.0	126	0.80
TMD ₁₂	40	25.0	157	0.64
TMD ₁₃	30	33.3	209	0.48

^(a) Power spectral density and Bode plots are plotted with respect to frequencies represented in ns^{-1} and rad/ns, respectively.

^(b) Total simulation period is $16 \times$ cycling period for each simulation, corresponding to 16 cycles of WPD loop opening and closing motion.