

Supplementary materials:

Modes of leaflet fluttering: quantitative characterization of a bovine bioprosthetic heart valve

Journal: Annals of Biomedical Engineering

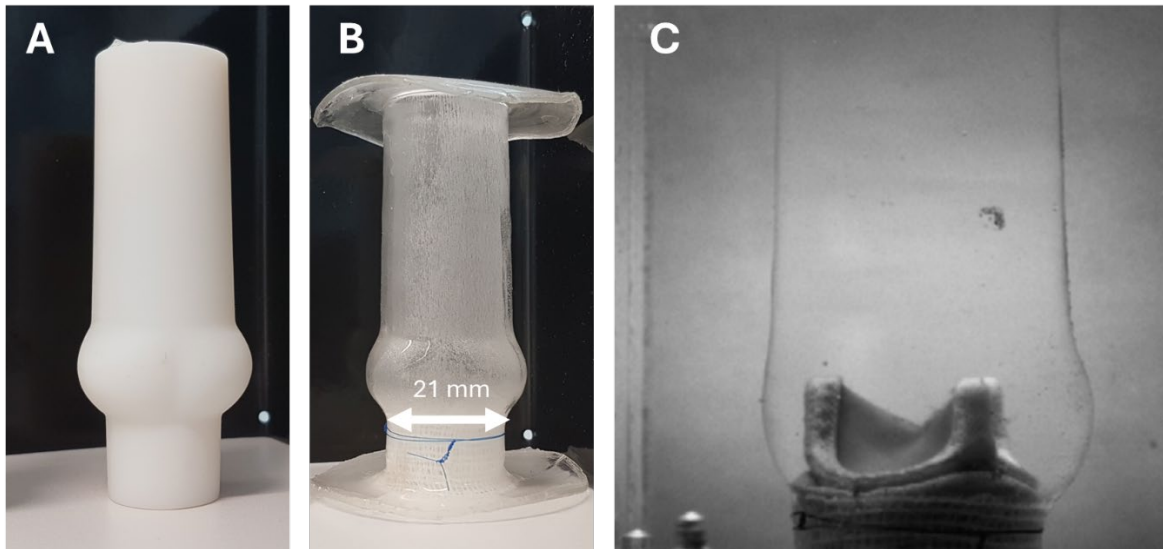
Silje Ekroll Jahren^{1**}, Bernhard Vennemann^{1,2**}, Karoline-Marie Bornemann^{1,3}, Thomas Rösger², Dominik Obrist¹

** shared first authorship

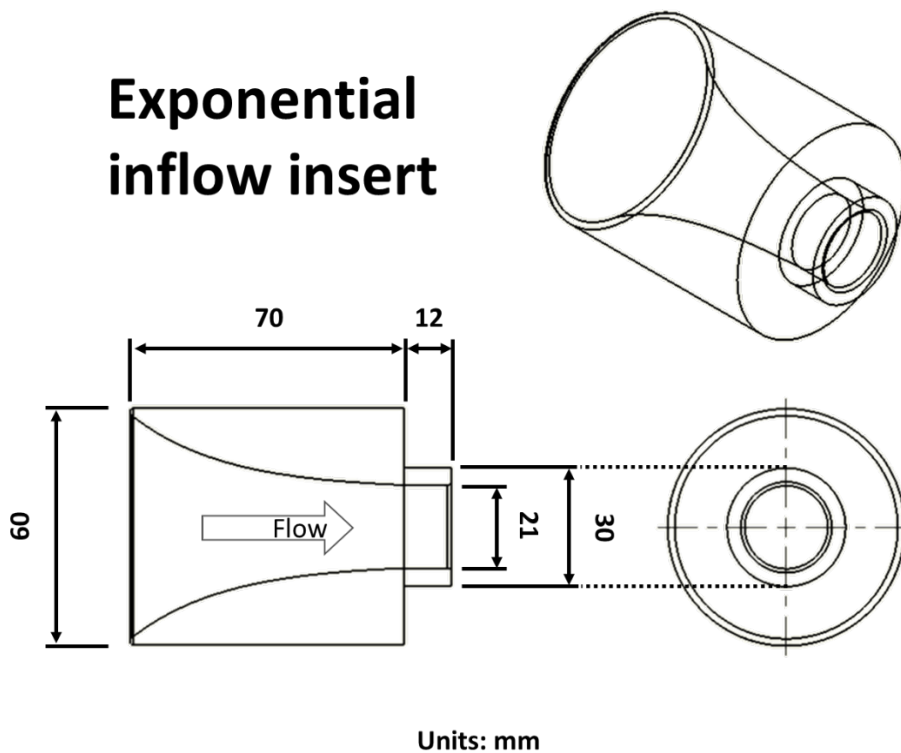
¹ARTORG Center for Biomedical Engineering Research, University of Bern, Bern, Switzerland

²Institute of Fluid Dynamics, ETH Zürich, Zürich, Switzerland

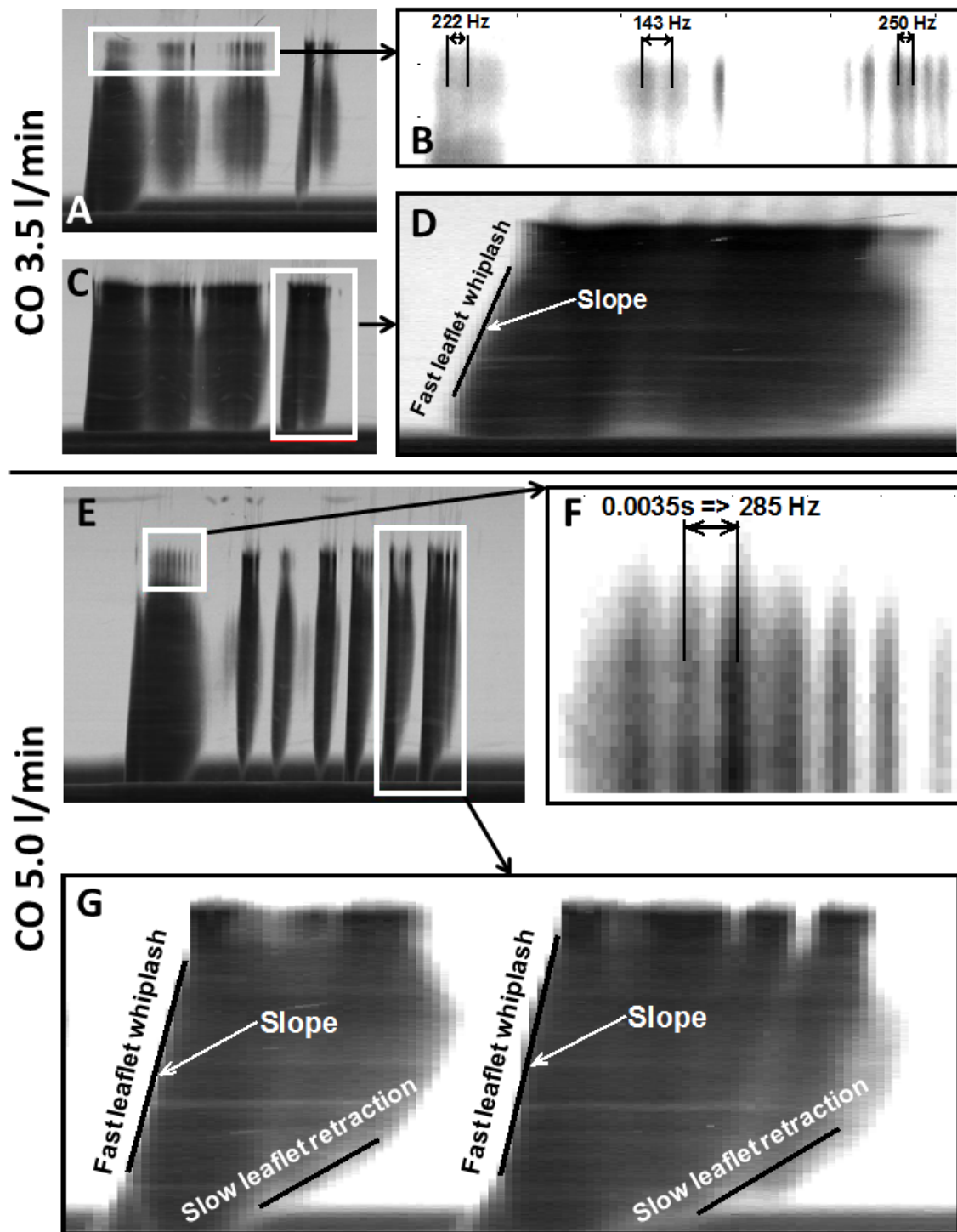
³Department of Pediatrics (Cardiology), Stanford University, Stanford, CA, USA



Supplementary Figure 1: Aortic root phantom fabrication: A) negative core of the phantom geometry to which silicone was added layer by layer, B) finished silicone phantom and C) phantom mounted in flow loop and with implanted bioprosthetic valve..



Supplementary Figure 2: Technical drawing of the exponential (EXP) inflow insert with dimensions in mm.



Supplementary Figure 3: A), B) High frequency tip fluttering (V-mode) and C), D) slow travelling waves (T-mode). E), F) V-mode and G) T-mode fluttering. The slopes in D and G indicate the wave velocities of the T-mode waves.

Supplementary Table 1: Overview of all measurements performed including resulting leaflet fluttering modes (T and V), frequency, amplitude and occurrence.

Inflow insert	Hemodyna mic condition	Measurem ent nr.	leaflet nr.	Leaflet rotational orientation	sinus nr.	Fluttering mode	Maximum frequency V-mode	Maximum amplitude V-mode	Number of T-mode waves	Maximum amplitude T-mode	T-mode frequency
[-]	[-]	[-]	[-]	[-]	[-]	[-]	[Hz]	[mm]	[-]	[mm]	[Hz]
NO	1	1	1	bottom	1	T			1	1.2	
			2	right	2	V	200	0.4	0		
			3	left	3	V	200	0.3	0		
		2	1	left	1	T			1	1.19	
			2	bottom	2				0		
			3	right	3	V	210	0.3	0		
		3	1	right	1	T			2	1	15-20
			2	left	2	V	150	0.2	0		
			3	bottom	3	V	200	0.4	0		
	2	4	1	bottom	1	V,T	285	0.4	2	2.01	25
			2	right	2	V,T	260	0.5	5	2.17	50-60
			3	left	3	V	285	0.6	0		
		5	1	left	1	V,T	285	0.4	5	1.6	30-40, 90
			2	bottom	2	V,T	180	0.4	6	2.29	50-60
			3	right	3	V	290	0.6	0		
		6	1	right	1	V,T	170	0.3	2	1.21	15-20
			2	left	2	V,T	310	0.3	7	1.21	60
			3	bottom	3	V	330	0.5	0		
EXP	1	7	1	bottom	1	T			1	1.32	
			2	right	2				0		
			3	left	3	V	220	0.4	0		
		8	1	left	1				0		
			2	bottom	2				0		
			3	right	3	V	200	0.3	0		
		9	1	right	1				0		
			2	left	2				0		
			3	bottom	3	V	210	0.3	0		
		10	1	left	3	T			2	1.95	30
			2	bottom	1				0		
			3	right	2	V	210	0.2	0		
	2	11	1	right	2	T			3	1.97	
			2	left	3				0		
			3	bottom	1	V	210	0.2	0		
		12	1	bottom	1	T			3	1.17	90
			2	right	2	V,T	290	0.2	2	0.93	85
			3	left	3	V	360	0.2	0		
		13	1	left	1	V	280	0.2	0		
			2	bottom	2	V,T	200	0.3	1	0.78	
			3	right	3	V	360	0.3	0		
		14	1	right	1	V	285	0.2	0		
			2	left	2	V,T	280	0.2	6	0.91	85
			3	bottom	3	V	380	0.2	0		
	2	15	1	left	3	T			4	2.58	85
			2	bottom	1	V,T	210	0.2	1	0.3	
			3	right	2	V	350	0.3	0		
		16	1	right	2	T			2	2.49	25
			2	left	3	V,T	260	0.3	1	0.8	
			3	bottom	1	V	370	0.2	0		