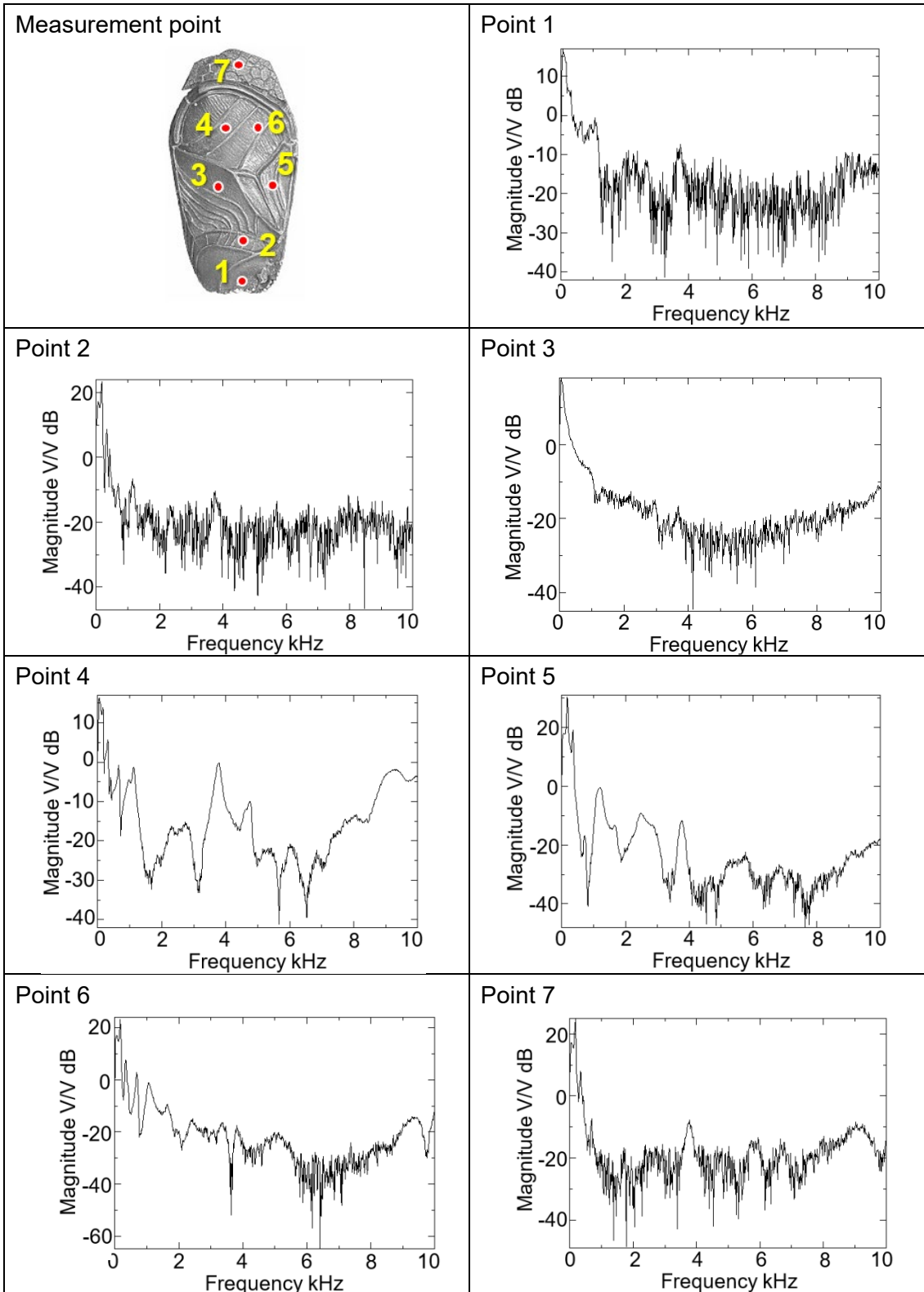
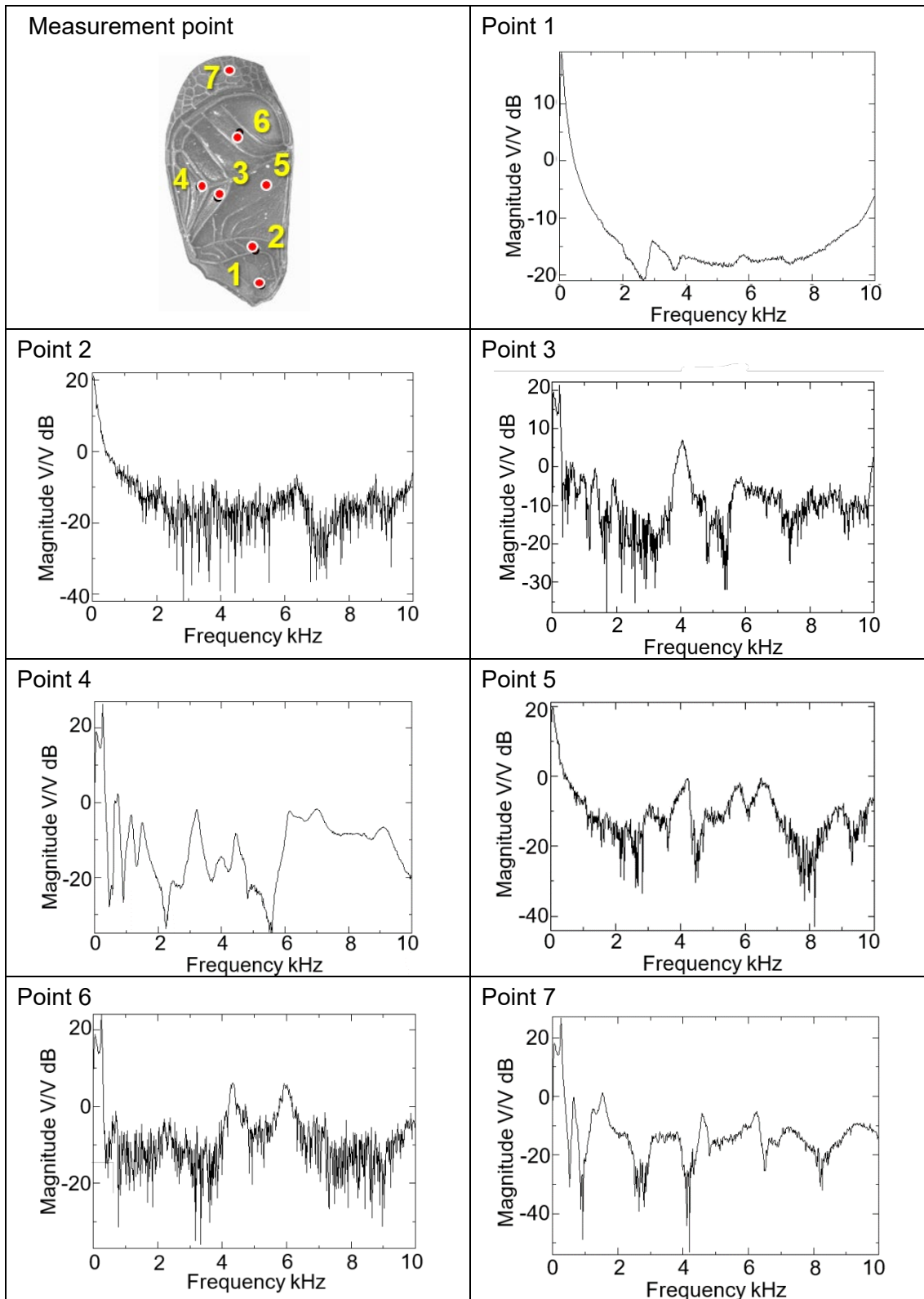


Supplementary Information

This document contains additional data supporting the experimental modal analysis presented in the main text. Supplementary Figure S1 and S2 provide the complete set of Frequency Response Functions (FRFs) for various measurement points on the forewings, corresponding to the representative data in Main Figure 3b. Supplementary Figure S3 displays additional vibrational mode shapes at various frequencies, expanding upon the 4.6 kHz modes shown in Main Figure 3c.

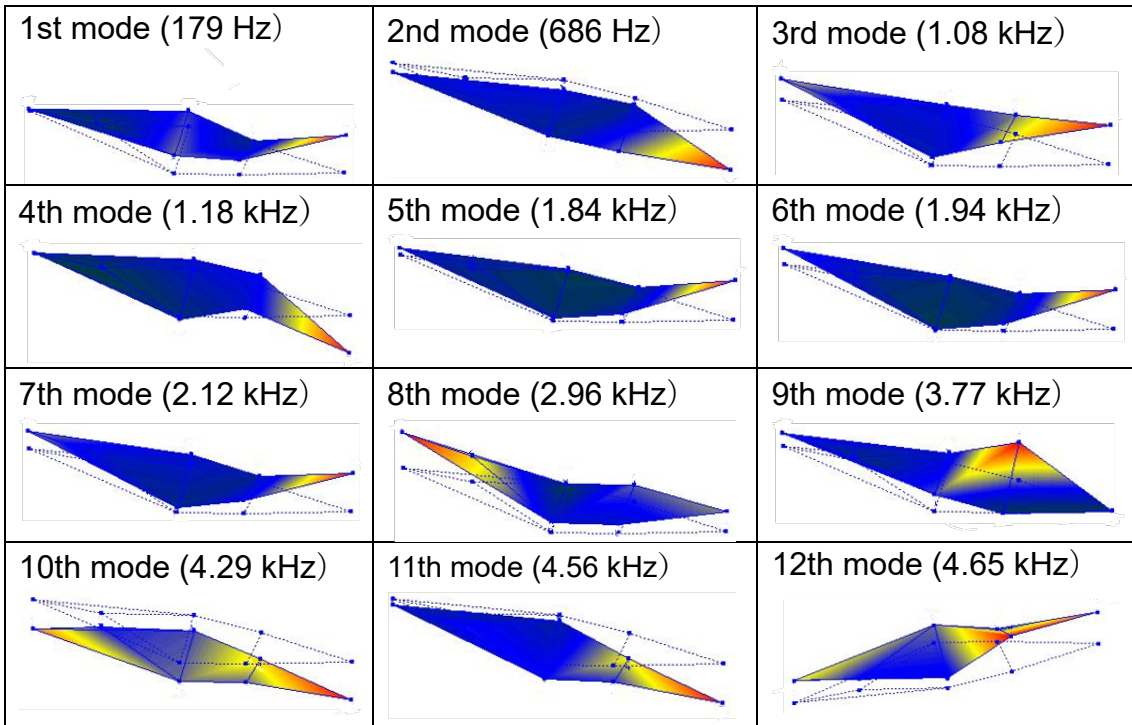


Supplementary Figure S1: Comprehensive frequency response functions (FRFs) of the right forewing. This figure presents the complete set of FRF data measured at all seven predefined points across the right forewing. These data complement the representative FRF (Point 4, mirror region) shown in Figure 3b of the main manuscript, demonstrating the consistent structural resonance across the entire wing.

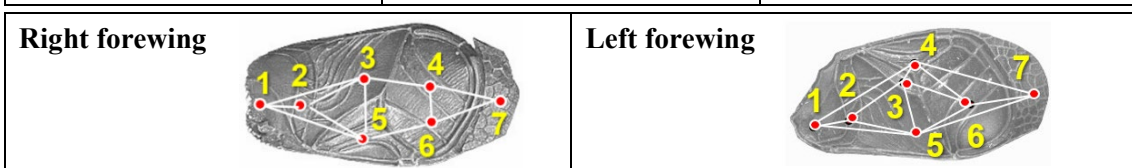
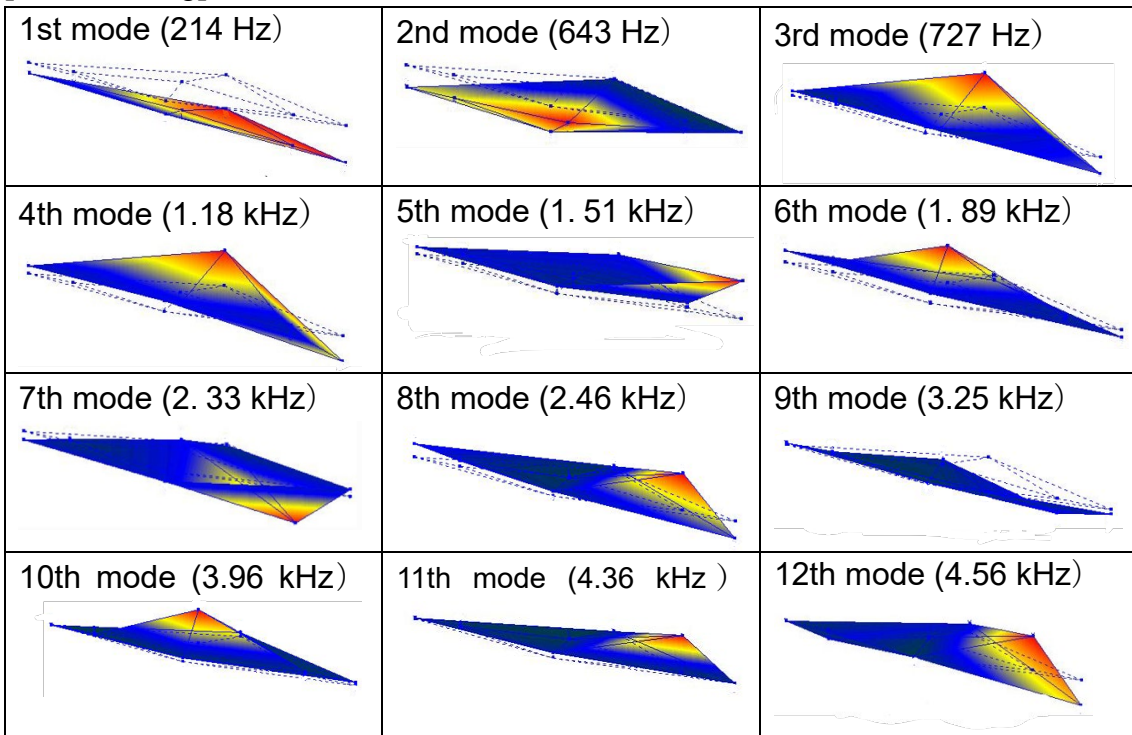


Supplementary Figure S2: Comprehensive frequency response functions (FRFs) of the left forewing. This figure presents the complete set of FRF data measured at all seven predefined points across the left forewing. These data complement the representative FRF (Point 6, harp region) shown in Figure 3b of the main manuscript, allowing for a detailed comparison of the vibrational characteristics between the left and right wings.

[Right forewing]



[Left forewing]



Supplementary Figure S3: Reconstructed 3D vibrational mode shapes at additional resonance frequencies. This figure presents the lower-order vibrational modes (e.g., the primary

bending modes near 200 Hz and intermediate modes) of both forewings. These data supplement the critical 11th and 12th sound-producing modes highlighted in **Figure 3c** of the main manuscript, illustrating the broader structural dynamic properties of the wing resonators.