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Experiments on blood-sucking mechanism of a female mosquito¹

SANG JOON LEE, Dept. of Mech. Eng., POSTECH, Republic of Korea, BO HEUM KIM, I-Bio, POSTECH, JUNG YEOP LEE, Dept. of Mech. Eng., POSTECH, BIOFLUID AND BIOMIMIC RESEARCH CENTER TEAM — The blood-sucking phenomena of a female mosquito were investigated experimentally. At first, the velocity fields of blood-sucking flow inside the proboscis of a female mosquito were measured consecutively using a micro particle image velocimetry (PIV) system. The velocity signals of the blood-sucking flow in the proboscis show a periodic pulsatile flow pattern and the spectral analysis of the velocity waveform exhibits a clear peak at 6.1 Hz. The blood flow inside the proboscis has a parabolic profile, similar to that of a Hagen-Poiseuille flow. In addition, the synchrotron X-ray micro-imaging technique was employed to visualize the dynamic movement of the two pumping organs (cibarial pump and pharyngeal pump) inside the head of blood-sucking using iodine solution as a contrast material. The temporal variation of the two pump organs of a female mosquito was found to be superior, compared to that of a male mosquito. In addition, we found the functional relationship of the two pumps operating in a systematic manner with a small phase difference.

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Sang Joon Lee
Dept. of Mech. Eng., POSTECH, Republic of Korea

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