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Global Pressure Measurement of Unsteady-State Flow and Motion on Fluttering Airfoil TAIKA OKABE, TAKESHI MIYAZAKI, The University of Electro-communications, KENICHI SAITOH, HIROTAKA SAKAUE, Japan Aerospace Exploration Agency — Pressure-sensitive paint (PSP) measurement has been applied to a fluid dynamic measurement. It can be applied to a steady-state flow in the transonic and supersonic wind tunnels. To extend the PSP measurement, an unsteady-state measurement is paid attention. It can be categorized by the unsteady-state flow and unsteady motion of the PSP-coated model. The former can be captured by using a porous PSP. The fastest PSP gives the response time on the order of ten microseconds. For the latter, the motion-capturing PSP method is studied to capture the unsteady motion. It consists of a two-color PSP and color camera. One color corresponds to the pressure-independent luminescence, and the other to the pressure-dependent luminescence. The former is used to cancel the pressure-independent distribution of a pressure-dependent image. The two-color images are simultaneously captured by the color camera. A combination of the unsteady-state flow and the motion can be occurred for an unsteady-state measurement. We present one of the cases, which is a flutter on an airfoil. By combining a porous PSP and the motion-capturing method, a pressure distribution on a fluttering airfoil (2-D YXX 30% span) is captured.

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