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Chaotic dynamics of a buoyancy-induced turbulent fire KAZUSHI TAKAGI, HIROSHI GOTODA, Tokyo University of Science, ISAO TOKUDA, TAKAYA MIYANO, Ritsumeikan University — We carry out a numerical study on the dynamic behavior of a buoyancy-induced turbulent fire from the viewpoints of symbolic dynamics and statistical complexity. The permutation entropy enables us to capture the significant changes in the dynamic behavior of flow velocity fluctuations. The possible existence of two important dynamics: low-dimensional chaos in the near-field dominated by the motion of large-scale vortices and high-dimensional chaos in the far-field forming a well-developed turbulent plume, is clearly identified by the multiscale complexity-entropy causality plane (Zunno et al., Phys. Rev. E 86, 046210 (2012); H. Gotoda et al., Phys. Rev. E 95, 022201 (2017)).

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