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3D vortical structures of wake behind a ring with helical disturbances JUN SAKAKIBARA, Department of Engineering Mechanics and Energy, University of Tsukuba, Japan, GUN SHIMIZU, Oriental Land Co., Ltd., Japan — Wakes behind a circular ring with/without helical disturbances were investigated. Cross-section of the ring was rectangular, and $D/W = 5$, where D is outer diameter and W is radial width of the ring. Reynolds number based on W was order of 100. Stereo-PIV was used to measure the three-component of velocity vectors in a plane normal to the free-stream direction. Taylors frozen field hypothesis was applied to reconstruct three-dimensional vorticity field. Under the unexcited condition, a series of vortex ring were shed from outer and inner side of the ring. In the case of $Re > 200$, streamwise vortices connecting successive vortex rings were observed. Above $Re = 300$ a recirculation zone was formed just behind the ring. Under the excited condition, where the ring was slightly tilted and direction of the tilting was rotated in time around the center of the ring, helical vortex structures were observed. In this case, the recirculation zone was not formed and drag applied to the ring was approximately 10% higher than the unexcited case.

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