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Experimental study on the flow around in-line array of spheres[1]
DAEHYEON CHOI, HYUNGMIN PARK, Seoul National University — In this study, we investigate the flow around a in-line array of spheres focusing on the interactions between the wakes flows. In a circulating water tunnel, 12.7 mm-diameter spheres have been aligned in line with the direction of flow, with each sphere held by a 0.1 mm thin stainless-steel wire. Considered Reynolds number for a single sphere is 1000 and the number of spheres is increased up to five with varying the distance between them, as well. To measure the flow field, we use dye visualization and PIV together, and the drag forces of each sphere are indirectly measured using two-dimensional optical micrometer. As the center-to-center distance increases, the wake instability in the gap between them is enhanced, and the axisymmetric structure of wake collapses and the turbulence levels becomes large. Based on this observation, flow structure around the sphere array is classified depending on the symmetricity, steadiness and turbulent intensity between spheres and the wake behind a following sphere. The drag on each sphere will be analyzed on the basis of this classification.

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