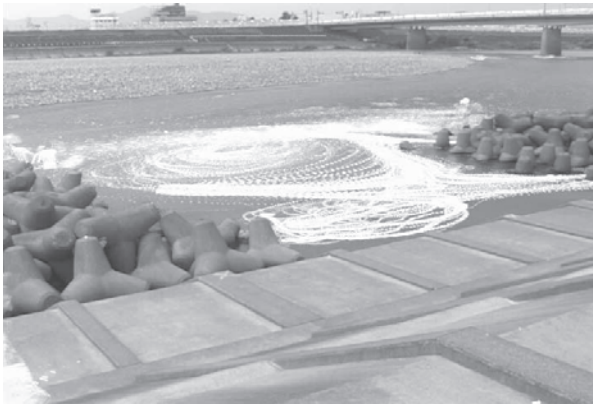


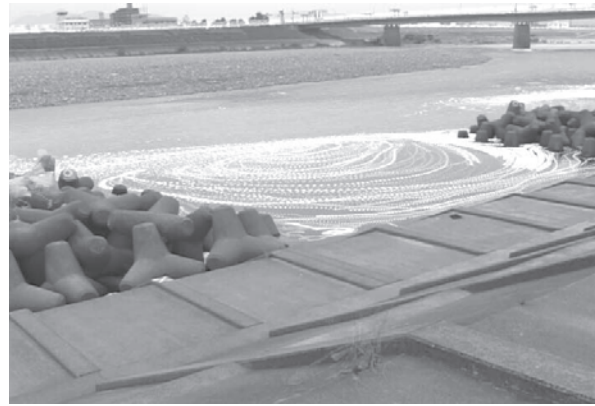
3. Surface flow pathlines between groins visualized by the DMS method

Fujita, I.¹⁾

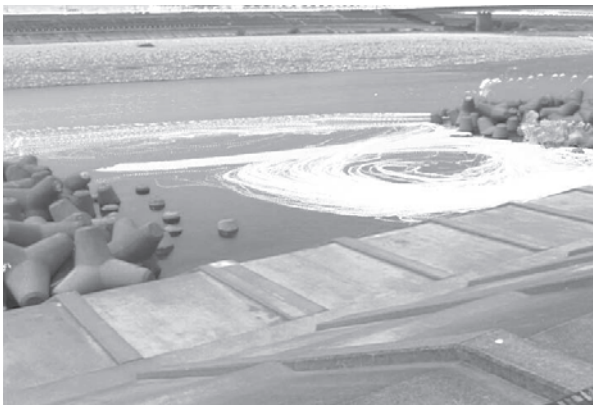
1) *Research Center for Urban Safety and Security, Kobe University, Rokkodai, Nada-ku, Kobe 657-8501, Japan*



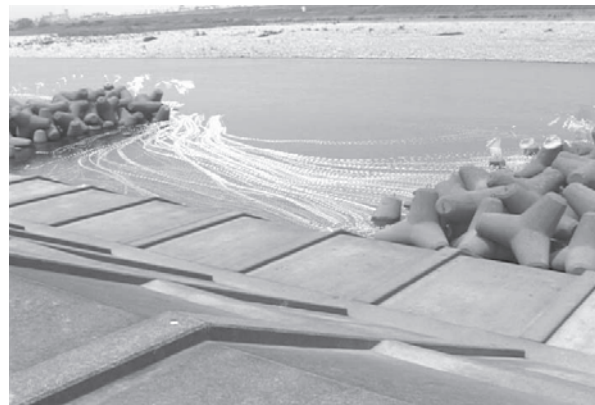
(a) Pathlines between 1st and 2nd groins



(b) Pathlines between 2nd and 3rd groins



(c) Pathlines between 3rd and 4th groins



(d) Pathlines between 4th and 5th groins

These figures show free-surface pathlines for the groin fields of the Nagara River (main flow from right to left). The surface flow is visualized using 5-cm long light pieces made of cornstarch, easily dissolved into water and non-toxic to the river environment. Pathlines are obtained by the Digital Multiple Superposing (DMS) method, i.e. by superposing hundreds of images sampled at time intervals varying from 0.5 to 3.0 seconds. Large-scale flow structure is completely different for each of the groin fields; counterclockwise flow structures are visible in the upstream two fields between 1st and 3rd groins, whereas flows are decelerated in the downstream fields.