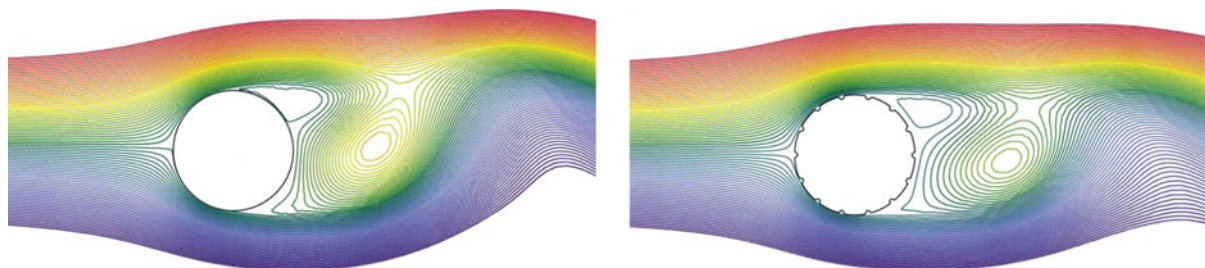# 4. Analytical Result of Two-dimensional Cylinder Model

Kimura, Y.[1], Aoki, K.[1], Oki, M.[2] and Nakayama, Y.[3]
1) *Tokai University, 1117 kitakaname, Hiratsuka, Kanagawa, 259-1292, Japan*
2) *Tokai University, 317 Nishino, Numazu, Shizuoka, 410-0321, Japan*
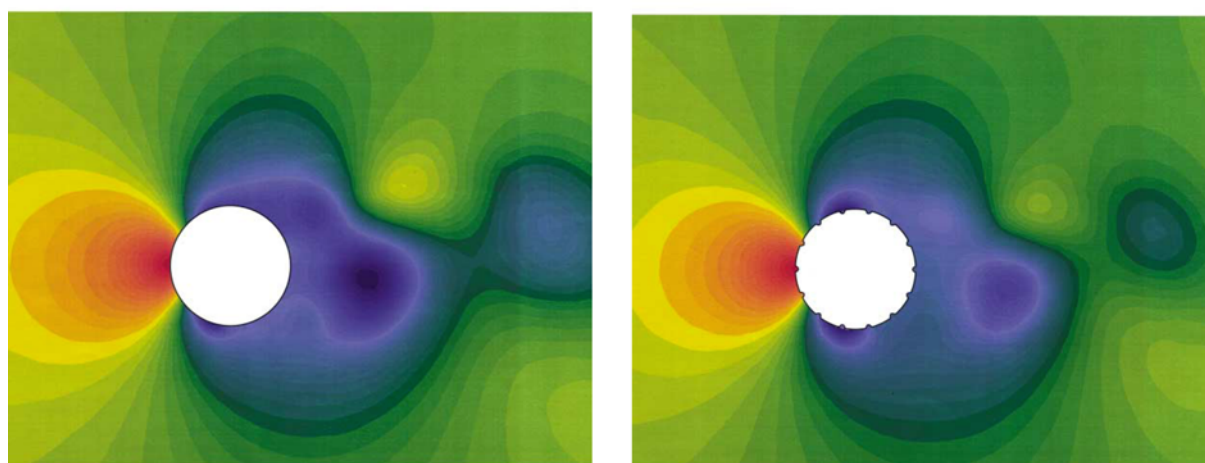3) *Future Technology Research Institute, 3-56-2 Higashi-Oizumi Nerima, Tokyo 178-0063, Japan*

| (a) Cylinder with smooth face | (b) Cylinder with grooves |

4.1 Stream lines

| (a) Cylinder with smooth face | (b) Cylinder with grooves |

4.2 Pressure distribution

4.1 and 4.2 show the results of the unsteady computation conducted for flows around two-dimensional cylinders using RNG k-ε models.

4.1(a) and (b) respectively show the stream lines around a smooth cylinder and another with 14 longitudinal grooves at Re=82,500. From these figures, it is found that the separation point for a grooved cylinder locates lowerstream than that for a smooth cylinder while the wake region for the former being narrower than that for the latter.

On the other hand, 4.2(a) and (b) respectively show the pressure distribution around the smooth cylinder and the grooved cylinder when Re=82,500. The pressure of the smooth cylinder in the downstream region in larger than that of the grooved cylinder in the similar region. From these figures, the drag for a grooved is smaller than that for a smooth cylinder.