

# **MECHANICAL ENGINEER**

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## **PERFORMANCE AND FLOW REGIMES IN PLANE 2-D DIFFUSERS WITH EXIT CHANNELS AT LOW REYNOLDS NUMBERS**

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A numerical study on laminar incompressible flows in 2-D straight walled diffusers in the low Reynolds number regime (105-1048) is presented to investigate performance and various flow regimes that might exist. Tail channels are situated downstream from the diffusers. Geometries with area ratios  $AR=1.15$  to 5 and non-dimensional lengths of  $L/W1=1$  to 48 are considered. Results are presented in terms of flow regime maps for Reynolds numbers of 105, 210, 314, 420, 629, 1,048 and pressure recovery coefficients maps for Re numbers of 105, 210, 314, 420 and 629. In addition, time resolved simulations of impulsively starting flow are considered at  $Re=210, 314$  for 12 geometries on the flow regime map. Four flow regimes can be distinguished depending on diffuser geometry. With increasing divergence angle the flow goes from attached to symmetrically separated to asymmetrically separated and finally to a non 2-D pattern respectively.

**KEYWORDS:** Diffusers, Low Reynolds, Diffuser Performance, Diffuser Flow Regime



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