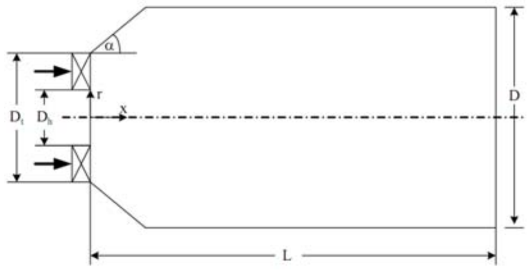

Figure 1. Channel configuration and computational domain

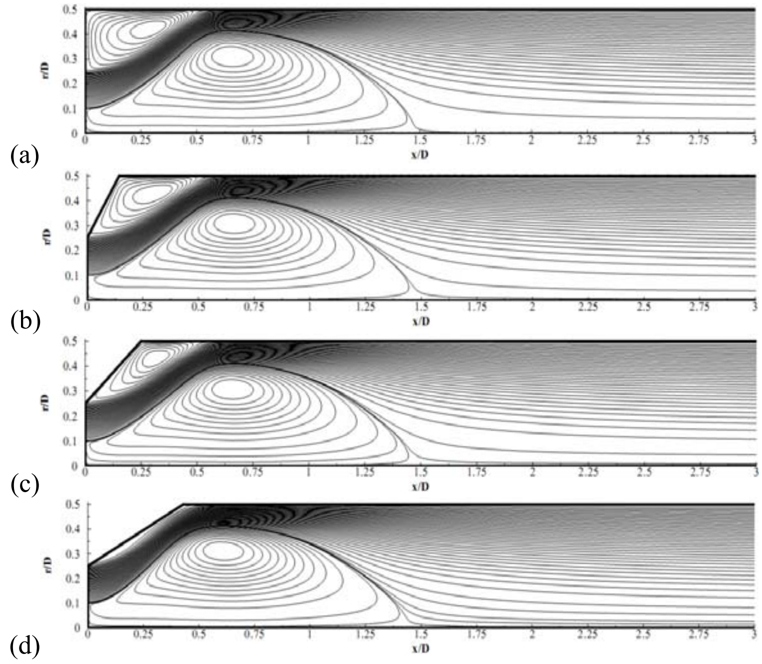

Figure 2. Predicted streamline plots in combustor with inlet swirl number (*S*) = 1.5 with side wall expansion angle, (a) α = 90°, (b) α = 60°, (c) α = 45° and (d) α = 30°

TURBULENT SWIRLING FLOW IN A COMBUSTOR WITH VARYING SIDE WALL EXPANSION ANGLE

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The visualization deals with the numerical study based on a finite volume method to characterize the turbulent isothermal (non-reacting) swirling flow in a combustor with varying side wall expansion angle after the swirl generators. The physical problem deals with the solution of an isothermal, turbulent flow within the confined geometry of an axi-symmetric combustor shown in Fig. 1. As the swirl number is increased to 1.5 (Fig. 2a), the central recirculation bubble grows in size both in the axial and radial directions and the maximum width of the recirculation occurs closer to the inlet. It reduces the corner recirculation zone considerably, and only a small corner bubble exists. The wider central recirculation zone leaves very little space near the periphery for the stream to flow, resulting in a higher stream velocity and longer recirculation length. However, some differences in the flow patterns are observed with a change in α (Fig. 2(b-d)). The small corner recirculation zone, which exists in the = 90° combustor, disappears when α is reduced to 60°, 45° and 30°. The central recirculation zone reduces slightly in length. The disappearance of the corner recirculation is due to the fact that with the angled side wall, the flow stream deflected by the large central recirculation bubble, attaches to the wall.