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Time-resolved PIV measurements of an axis-symmetric forward-facing cavity. SYED HASSAN RAZA SHAH, Auburn University,Auburn AL, ANWAR AHMED, Auburn University, Auburn AL — The flow field of an axis-symmetric forward-facing cavity was experimentally investigated at Reynolds Number of 5,000 and 20,000 for three different aspect ratios (length/diameter) 1, 1.5 and 2 in the water tunnel using time-resolved particle image velocimetry. The location of the primary singular point was observed to depend upon aspect ratio for a given Re. Spatial oscillations of the primary singular point were observed that influence the formation of the separation bubble at the lip of the cavity and its convection downstream. The dividing streamlines shifted towards the outer wall for aspect ratio 2 and Re 20,000, two counter structures were observed inside the cavity. These vortices started to merge at aspect ratio 1.5 and transformed into one large structure for aspect ratio 1. The POD analysis of the PIV data was performed to understand the role of eddies emanating from the face of the cavity. The wake power spectra also contain the frequency of oscillations indicating close coupling between the two flows (external and internal).

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