Both the NCEP/NCAR reanalysis data and the composite analysis are employed to study the impact of inertial instability on the onset processes of the Indian Summer Monsoon (ISM). The inertial instability results from the strong cross-equator pressure gradient. It's found that the effect of inertial instability, which is manifested as the northward displacement of the zero contour of absolute vorticity over the Arabian Sea, is of great importance during the ISM onset period. With the absolute vorticity zero contour shifts poleward from the equator, the lower convergence corresponding to the development of monsoon convection is on the north of the contour and moving northward in the vicinity of the west coastline of the Indian Peninsula. Besides in the Northern Hemisphere, there is a negative absolute vorticity region between the absolute vorticity zero contour and the equator, where the lower tropospheric meridional circulation is divergent. This meridional convergence-divergence doublet is the primary performance of the inertial instability. The mechanism of inertial instability on the Arabian Sea can not completely be explained via the boundary layer dynamics. Except for the drag coefficient effect in boundary layer, the analytic solution shows that the inhomogeneous zonal flow in the lower troposphere can also lead to the latitudinal difference of meridional wind, contributing to the lower convergence on the Arabian Sea and the Indian monsoon onset.