Operation limits in KSTAR

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The operation limit of a tokamak can be generally characterised by Hugill diagram [1] where the run-away, the Greenwald density [2], and the plasma current limit can be presented. In this study, we investigate the operation regime of KSTAR via Hugill diagram plotted using experimental database collected from FY 2011 to 2013. By analysing discharges with density limit disruptions, its dependency on external heating power and radiation-driven resistive MHD instabilities are stressed. Interestingly, no clear low density limit is observed in common KSTAR operations. However, low density limits are found to appear as applying MP (magnetic perturbation) due to occurrence of disruptions by locked modes. This low density limits are discussed in connection with error fields. Finally, we compare density limits of L-modes and H-modes so that the performance limit is discussed.