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P1.1008 Fundamental O-mode ECRH assisted low-loop voltage plasma start-up in tokamak ADITYA-U

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The EC assisted low-loop voltage plasma start-up experiments have been carried in Tokamak ADITYA-U. The 42GHz ECRH system is used for off-axis breakdown in tokamak, which is operated at a toroidal magnetic field of ~ 1.2T. The EC power in fundamental O-mode is launched from low field side of the tokamak. The EC power and duration for breakdown are varied from 75kW to 150kW and from 50 ms to 100 ms respectively. The ECRH power is launched around 25ms before the start of the loop voltage and successful plasma start-up is achieved with 30-35% reduction in the peak loop voltage. In ADITYA-U, the gas breakdown and successful plasma start-up is normally achieved atpeak loop-voltage of ~20V (Electric field ~ 4.5V/m). In these EC-assisted low-loop voltage plasma start-up experiments, the peak loop voltage is reduced to 30–35% (~13V) by reducing the resistance values in the ohmic circuit. Without the EC assisted pre-ionization, no successful plasma start-up has beenachieved at this loop voltage. However, when EC-power launched around 30ms before the start of the loop voltage andpre-ionization is created with the help of EC, successful plasma start-up and current ramp-up has been achieved similar to those obtained at higher peak loop voltages without the EC pulse. Successful EC-assisted plasma discharges with plasma current ~115kA and discharge duration of ~250ms has been achieved with low (~13V) peak loop-voltage. The hydrogen fill pressure is ~1x10^-4mbar and the pre-ionized plasma density is ~ 1x10^18m^-3. As the pre-ionized plasma breakdown is obtained through fundamental harmonic of EC, the Halpha emission appears almost simultaneously with the start of EC-power pulse. It shows no delay in breakdown at fundamental harmonic. The EC-assisted low-loop voltage experiments arecontinuingfurther to obtain plasma discharges with peak loop voltage <10V in ADITYA-U. The paper will discuss the technical and physics details on fundamental harmonic EC assisted breakdown and successful low peak-loop-voltage plasma start-up in ADITYA-U.

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