

# In-vessel Dust Velocity Correlated with the Toroidal Rotation of the Plasma

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- We have analyzed around 4000 dust trajectories in visible CCD images captured during three campaigns from 2010 to 2012 by using dedicated software developed at KSTAR to extract dust velocity distribution.
- Dust velocities are in a range from  $\sim 10$  m/s up to  $\sim 460$  m/s, well described by log-normal distribution function.
- The peak velocity of the velocity distribution increases as the input energy level increases.
- It is shown that the dust velocity is linearly proportional to the toroidal plasma rotation velocity as a function of normalized stored energy ( $W/I_p$ ).
- The velocity of carbon dusts of a size of  $1.0 \mu\text{m}$  with a density of  $\rho = 2.1 \text{ g/cm}^3$ , accelerated for 15 ms by ion drag force, is calculated and compared with the measurements.
- The measured and calculated ones have "good match" at low plasma flow velocity while it shows a certain deviation at high plasma flow velocity indicating that there might be some effects other than ion drag at high velocity range.

