A 2-Dimensional full particle simulation of the electric field around the moon

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In order to see the electric structure around the moon, a 2D full particle electrostatic simulation is carried out. The moon is put in the simulation box, in which solar wind ions and electrons flow past the moon. To simulate the real solar wind, the thermal velocity of ions is set to be 0.12Vsw, where Vsw is the solar wind speed. The ion to electron mass ratio is set to be 100, resulting in the thermal velocity of electrons of 1.2Vsw. The Debye length is 1.1 times as large as the moon radius, although it is larger than the Debye length 33m observed in the solar wind. If a particle hits the moon, the particle is fixed at the position. In the case of no background magnetic field, an intense potential appears on the dawn and dusk sides of the moon. The potential difference is 250V. Behind the moon, the potential difference is 180V. Introducing a background magnetic field whose direction is 45 degrees with respect to the solar wind flow, we obtain more intense electric potential on one side of the moon. It is 1.7 times as large as in the case of unmagnetized plasma.