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STUDY OF PICKUP OF COMETARY IONS IN TURBULENT SOLAR WINDS

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The influence of moderately strong or strong magnetic turbulence on the ion pickup process near a comet is studied by a test-particle method. The research is motivated by recent observations with ICE and Giotto at Giacobini-Zinner and Halley. In this numerical study, we have modeled the intrinsic hydromagnetic turbulence based on the Giotto and ICE data. The time evolution of the distribution function of the newborn ions is investigated. It is found that, when the level of the intrinsic turbulence is sufficiently high, the pickup ions can form a shell distribution function rapidly. The typical time scale for such a process is of the order of a couple of ion gyroperiods. On the other hand, if the turbulence is not strong, the pickup ions usually form an incomplete shell in the initial stage. The results seem to be consistent with available observations.