



## Current density measurements in space plasma

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One of the most important parameters governing the physical processes in space plasma are spatial currents. Many attempts are known to measure directly the space current density but no one of them was completely successful. There are two devices already constructed and tested in space - split Langmuire probe (SLP) and current coil (or Rogovsky coil) (RC). Their comparison shows that each of them has its own disadvantages do not allowing to get reliable results of current density measurements. For SLP the major problem is that till now there is no complete theory of its interaction with space plasma. Also it was found that solar illumination is the main factor disturbing the SLP operation. Nevertheless the physical modeling made in plasma chamber gives hope that the more or less reliable measurements results can be obtained at present level of SLP modernization. The main principles of SLP interaction with space plasma allowing to determine the SLP transfer function and its dependence on surrounding plasma parameters are reported. Also the comparative tests results obtained in plasma chamber imitating plasma density at ionospheric height are presented. As to RC, it was discovered that the magnetic field influence is the most important disturbing factor of RC measurements. Its presence leads to the situation when the magnetic field dependent component in the RC output signal is about one order of magnitude and even more than the current produced one. In December 2004 the Ukrainian remote sensing satellite was launched with international experiment VARIANT having three current density meters - SLP, RC and Faraday cup - on board. Due to the rocket malfunction it was placed at other than planned orbit and functioned very little period. Some data from all three simultaneously operating devices were obtained nevertheless. The first processing results are reported. This study was supported by NSAU Contract No 1-02/03 (1274).