

**Contracts Final Presentation 19-20 Feb. 2004**

**1. Title of the presentation**

The Open Source Strategy Applied to a Spacecraft-Plasma interaction Simulation Tool, PicUp3D

**2. Speaker**

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**3. Abstract**

PicUp3D is an electrostatic multi-species 3D Particle-In-Cell (PIC) code dedicated to the modelling of the electrostatic sheath of spacecraft. Fully written in JAVA and able to model 3D realistic geometries, PicUp3D is designed to perform fine modelling for various purposes, especially scientific instruments calibration, and active device environment analysis such as ion thrusters. The development of PicUp3D was initiated in the context of the IPICSS project, for Investigation of Plasma Induced Charging of Satellite Systems, in partnership between IRF-K, ESA, CNRS/CETP and CNES, in the framework of the SPINE network and an ESA Academic Research Programme. The development time was followed by a long validation phase during which PicUp3D was intensively tested and used for mission supports at ESA. These application cases have confirmed the ability of PicUp3D models to simulate correctly modern spacecraft-plasma interactions problems. To induce a strong synergy with the scientific and the industrial communities, PicUp3D was developed with an open source software approach, such that the source code is freely accessible and the models can be tailored, validated or deeply modified by advanced users. PicUp3D has been released (<http://www.spis.org>) for the first time in December 2002 under the GPL license and is now freely available. Since then, feedback have been collected and contributed to improve the code by integration of new models, such as a multi-grid field description, or technologies, such as a script command layer. In parallel, this interaction with the user community have helped to identify key issues that should be taken into account to support a community based development of the next generation spacecraft-plasma interaction simulation library (SPIS). The current status of PicUp3D is presented and analysed with respect to the initial objectives of the project.