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ADVANCED POINTING IMAGING CAMERA (APIC) CONCEPT. R.S. Park[1] and J.E. Riedel, [1]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA (e-mail Ryan.S.Park@jpl.nasa.gov)

Introduction: Advanced Pointing Imaging Camera (APIC) is a high-resolution imaging system which simultaneously takes images of targets and star fields with two-axis control capability, allowing rapid target imaging and image motion compensation (IMC) with extremely precise pointing knowledge. Such imaging data can accurately measure the geophysical property and high-resolution topography of target objects. Figure 1 shows the CAD drawing of APIC and Table 1 shows its characteristics.

Main Objectives: The main science application of APIC is to serve as a geodesy/geophysical instrument which can provide the data to constrain the interior structure of planetary objects. Specific science objectives include: Determination of geometric tidal flexing of natural satellites and Determination of rotational libration, nutation, and precession of natural satellites and asteroids.

Science and Engineering Enabled by APIC:

- APIC's 2-DOF actuation would allow significantly more effective and efficient science/mission operations by providing rapid and flexible imaging capability (e.g., significant reduction in mission duration and much less constraints on spacecraft operational geometry).

- APIC's IMC ability, using the internal gimbal and attitude knowledge dramatically reduces the implementation and operational cost of IMC for any mission, and increases the achievable resolution of fast flyby missions.

- APIC's high-resolution narrow-angle-camera (NAC) and a wide-angle-camera (WAC) would provide important unique science return via the ability to simultaneously take the images of target body and star field, allowing high-resolution surface imaging with extremely precise pointing knowledge. Such imaging data with precise pointing information can accurately measure the tidal deformation and/or libration/precession of the target body, and thereby reveal target body's interior structure

- Furthermore, APIC can provide data for stereo (or stereophotoclinometric) reconstruction of target topography, including shape, size and volume, with control networks that would provide very accurate determination of the target-relative position of the spacecraft.

- APIC's combined functionalities would offer a powerful optical navigation capability, that would significantly enhance spacecraft orbit reconstruction and prediction accuracy, and thus, reducing operational cost. Furthermore, APIC can serve as an ideal platform for autonomous navigation and internal star-finding/tracking can provide backup attitude information for the host spacecraft

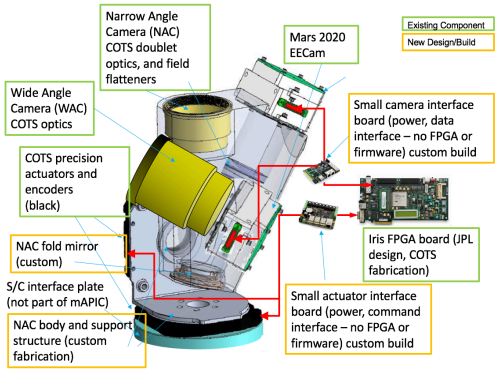

Figure 1: APIC current design showing principal components and heritage

Parameter	Values
Dimension	~2U
Mass	4 kg
Rad Shielding	0.5 kg
Power	12 W
Image Res	19 µrad
Pointing Knowledge	2 arcsec
Az Range	inf
El Range	±90°
Az max rate	30°/s
El max rate	30°/s

Table 1: APIC characteristics

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