

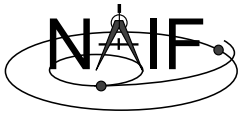


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Navigation and Ancillary Information Facility

# **SPICE Development Plans and Possibilities**

**October 2007**

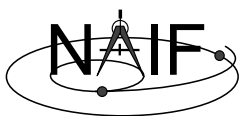


## **Outline**

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Navigation and Ancillary Information Facility

- **Work in progress**
  - MATLAB interface to CSPICE
  - Shape model subsystem
  - Geometric Event Finder subsystem
- **Future possibilities**
- **Your suggestions?**



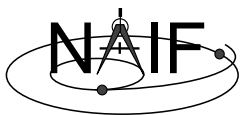
## Work In Progress

Navigation and Ancillary Information Facility

- **MATLAB interface to CSPICE**
  - Complete the beta-testing, make needed revisions, add additional functionality (interfaces to CSPICE modules) if/as needed to have a reasonably complete set
  - Provide official packages in a future Toolkit release
    - » Likely later in CY 2007
- **Shape model subsystem**
  - Synthesis of current shape model (triaxial ellipsoids), “plate model” for small, irregularly shaped bodies, and a digital elevation model
  - Beta-test version might be available later in CY2007
  - Official addition to Toolkit probably in first half of CY2008
- **Geometric event finder subsystem**
  - Find time(s) when such-and-such a geometric condition exists
  - Beta-test version might be available later in CY2007
  - Official addition to Toolkit probably in first half of CY2008

Plans and Possibilities for Further Development

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## Other Possibilities - 1

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Java/Spice Interface test

Kernels Computations Drawings Log

### Illumination Angles "GEOCALC"

Target: Mars

Observer: MEX

Surface point longitude: 114.786907

Surface point latitude: -14.773171

Observation epoch: 2004 Jan 4 08:52:00.707724

Aberration Correction: NONE, LT, LT+S

Coordinate System: Planetocentric, Planetodetic

Compute

Illumination angles at surface point, as seen from observer

Target	Mars
Observer	MEX
Aberration correction	NONE
Time	2004 Jan 4 08:52:00.707724
Surface planetocentric longitude (deg)	114.786907
Surface planetocentric latitude (deg)	-14.773171
Phase angle (deg)	37.317459
Solar incidence angle (deg)	37.317454
Emission angle (deg)	0.000007

GUI interface to a limited set of SPICE computations.

In this example, compute the illumination angles on Mars at LON 114.7 and LAT -14.7 as seen from Mars Express on 2004 JAN 4 08:52:00. The user can pick either a planetocentric or planetodetic reference frame.

Plans and Possibilities for Further Development

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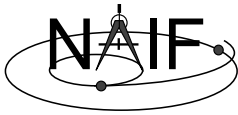


## Other Possibilities - 2

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- **Additional interfaces to SPICE:**
  - Java Native Interface (JNI), Python
- **Additional target models: rings, gravity, atmosphere, magnetosphere, ...**
- **Develop a more flexible and extensible instrument modeling mechanism**



## Other Possibilities - 3

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Navigation and Ancillary Information Facility

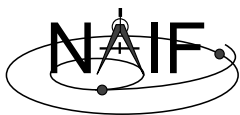
- **Provide tools for easier specification and visualization of reference frames**
- **Provide a “predict spk” tool that makes it easy to construct an SPK file from simple rules**
- **Provide a better interface with the extensive comet/asteroid ephemeris database implemented by JPL’s Solar System Dynamics Group**
- **Provide extended precision calculations for time and other quantities used by Radio Science investigations**



## Other Possibilities - 4

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- Add more high-level computations, such as instrument footprint coverage
- Provide a C-Kernel merge utility, analogous to the existing SPKMERGE program



## What do You Suggest?

Navigation and Ancillary Information Facility

- NAIF solicits suggestions from the user community. 😊
  - We're a small team and have a lot on our plate already, so can't promise any particular action. 😞
- We're interested in programmatic ideas as well as technical ones.
  - Should NAIF promote use of SPICE beyond NASA's planetary science program?
  - What amount of cooperation and interoperability with foreign partners is appropriate and achievable?
    - » Formal versus informal?
    - » With scientists and/or with engineers?