

PDS Reviews: Comet Rotation Table (primary) and Deep Impact Spice Kernels (secondary)

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Comet Rotation Table Database

- Overview:
 - The table/database to be placed into the PDS-SBN is taken, with some additional information added, from the source
“Rotation of Cometary Nuclei” by N.H. Samarasinha, B.E.A. Mueller, M.J.S. Belton and L. Jorda, in Comets II.
- Review:
 - The data will be useful and appears to be correctly transcribed from the article. There are several format issues that must be addressed, however, before the data should be accepted. None of these issues are major, I believe, but will involve some hand-editing of the format.
 - Question: Is the intent of this database to start a new compilation of comet rotation states that will be expanded with new data?

Current Entries

- Column:
 - 1: Periodic number
 - 2: Comet Type, P or C
 - 3: Comet name
 - 4: Discovery ID code
 - 5: Spin Mode -- excited or unexcited
 - 6: P_Phi -- Mean period of precession of the long axis about the angular momentum vector
 - 7: P_Phi_Flag -- indicates synodic or sidereal
 - 8: P_Psi -- The period of oscillation (for short-axis modes) or rotation (for long-axis modes) about the long axis
 - 9: P_Psi_Flag -- indicates sidereal or synodic
 - 10: Theta -- angle between angular momentum vector and long axis

Current Entries

- Column:
 - 11: P_Total -- Total mean period about the angular momentum vector
 - 12: P_Total_Flag -- sidereal or synodic
 - 13: M_alpha -- right ascension of angular momentum vector
 - 14: M_delta -- declination of angular momentum vector
 - 15: M_flag -- indicates if sense of rotation is known
 - 16: Long_Axis_alpha -- right ascension of long axis at epoch
 - 17: Long_Axis_delta -- declination of long axis at epoch
 - 18: Epoch -- epoch of M and Long_Axis values

Comet Database Recommendations

- Column 2-3: Comet Type and Name
 - Specify the presence of the “/” in the table format. Usual part of a comet’s name.
- Column 5: Spin Mode
 - Current defined entries are “Unexcited” and “Excited (LAM)”
 - Define “Blank” entry as “?”
 - Define “Excited?” entry
 - Should a separate column for the “LAM” or “SAM” rotation state be added? Additional data in the future may provide more diversity than here currently.
- Column 7: P_phi Flag
 - Current defined entries are “S” for sidereal and “-” for synodic
 - Better definition of the “?” entry needed. Is it a “blank” symbol?

Comet Database Recommendations

- Column 8: P_Psi
 - Should give consistent number of significant digits, relative to Column 6, which is F6.4
 - Should use consistent “blank” symbol with Column 6, current is “-.99”.
- Column 9: P_Psi Flag
 - Define the “?” entry, it is currently undefined.
- Columns 10, 13, 14, 16, 17:
 - All these columns define angles, and are currently specified as integers with missing constant values of “0”
 - Data type should all be real, no integers.
 - A consistent number of significant digits in the format needed
 - A consistent missing constant designator should be used, such as “-99.99”.

Comet Database Recommendations

- Column 10: Theta angle
 - This angle actually will librate between limits, definition should note that this is an “average” or “approximate” angle
- Column 15:
 - M_Flag: defines if sense of rotation is known
 - Since the nominal entry is a “blank”, would recommend using a true blank for this.
 - Perhaps use a more definite symbol/word than “?” to indicate if the sense of notation is unknown

Spice Kernels

- Overview:
 - Database of all relevant geometric and dynamic variables and events for the spacecraft in question.
 - Database includes the following “kernels”:
 - Attitude of spacecraft
 - Special events on the spacecraft
 - Proper coordinate frame definitions
 - Instrument mounting geometry on the bus
 - All leap seconds that occurred during the time spans
 - Planetary constants file
 - S/C to ephemeris time mapping
 - Spacecraft and planetary ephemeris

Review of Spice Kernels

- Both datasets have identical format and structures.
- cursory checks show that the data content between the two datasets relate to the proper events
- Mission descriptions for both appear adequate
- Additionally, complete descriptions of the Spice Kernels are given, along with directions that point to the S/W necessary to use them

Recommendations/Requests

- There are no concerns or issues with the data as delivered.