

# Photometric Analysis of Shape-Model Generated Lightcurves of Selected Main-belt Asteroids

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# Overview of Marciniak+2012

1. observed 8 main-belt asteroids
2. 199 new lightcurves (Poznań Astronomical Observatory, 1997-2011)
3. obtained asteroid shape models and spin states via the convex lightcurve inversion method
4. create an online service for the comparison of asteroid shape models

# Motivation and Background

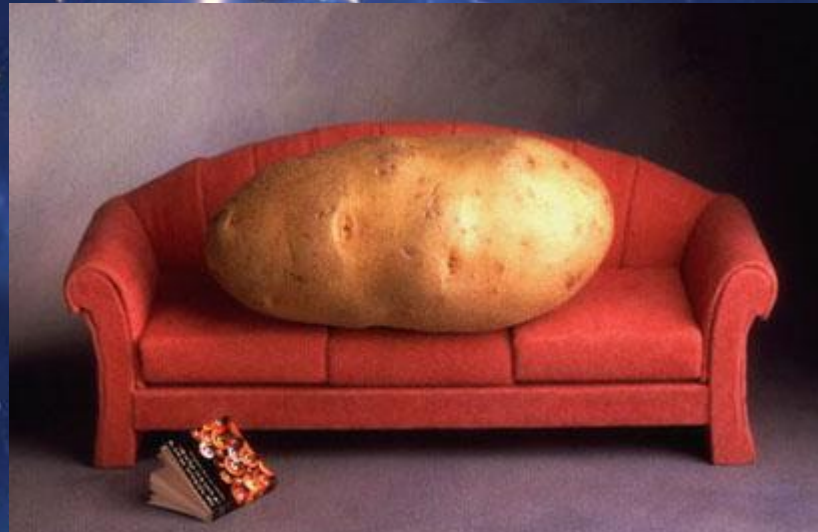
1. determine basic physical characteristics of an asteroid (i.e. shape and spin)
  2. then we can better understand the nature of individual objects as well as the whole asteroid population
  3. So, how do we determine these basic physical characteristics?
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# Lightcurve Inversion Method

Ingredients:

1. need several lightcurves from a span of phase angles
2. observations need to span several different apparitions

# Lightcurve Inversion Method



Kaasalainen et al. 2001

# ISAM

## Interactive service for asteroid models



Licence



25143 Itokawa  
(model 1)

Date: (dd-mm-yyyy)

11 - 12 - 2014

Time: (hh:mm:ss)

8 : 5 : 23

JULIAN DATE

Legend:

in colour

- Show rotation axis
- Generate lightcurve
- 3D effect
- LT corrected view
- Full silhouette

SHOW

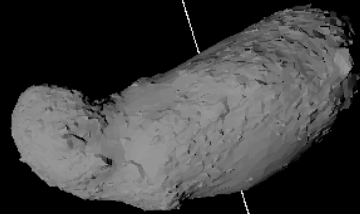
Video Back

25143 Itokawa  
JD=2457002.8277

Save to gallery

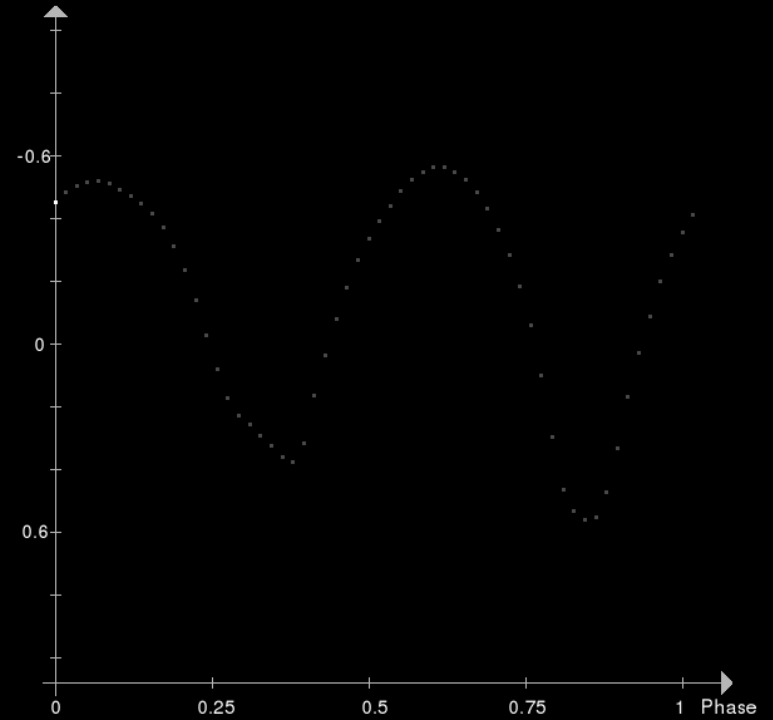
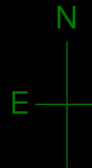
Brightness [mag]

$\lambda = 269^\circ$   
 $\beta = -90^\circ$



Aspect =  $89^\circ$

P = 12.132395 h

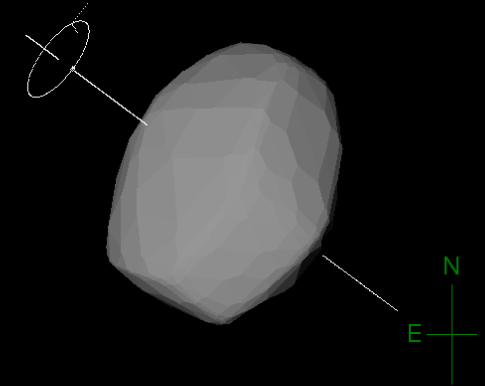


# 76 Freia D=168[km], a=3.41[AU], e=0.163, i=2.12°

76 Freia  
JD=2444850.7777

$\lambda = 140^\circ$   
 $\beta = 14^\circ$

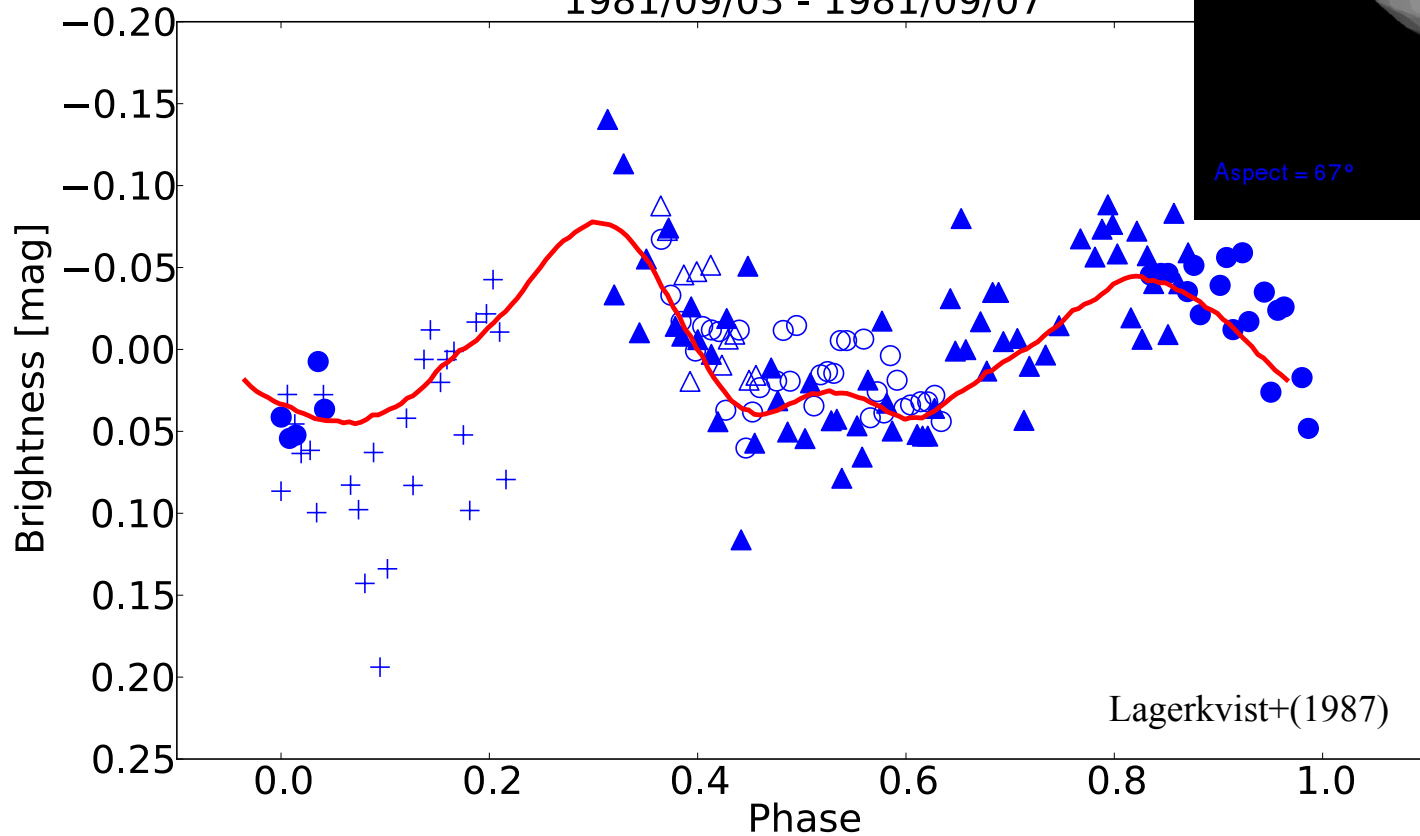
phase angle (STO): 11.92°-10.94°



Aspect = 67°

P=9.973060 h

1981/09/03 - 1981/09/07



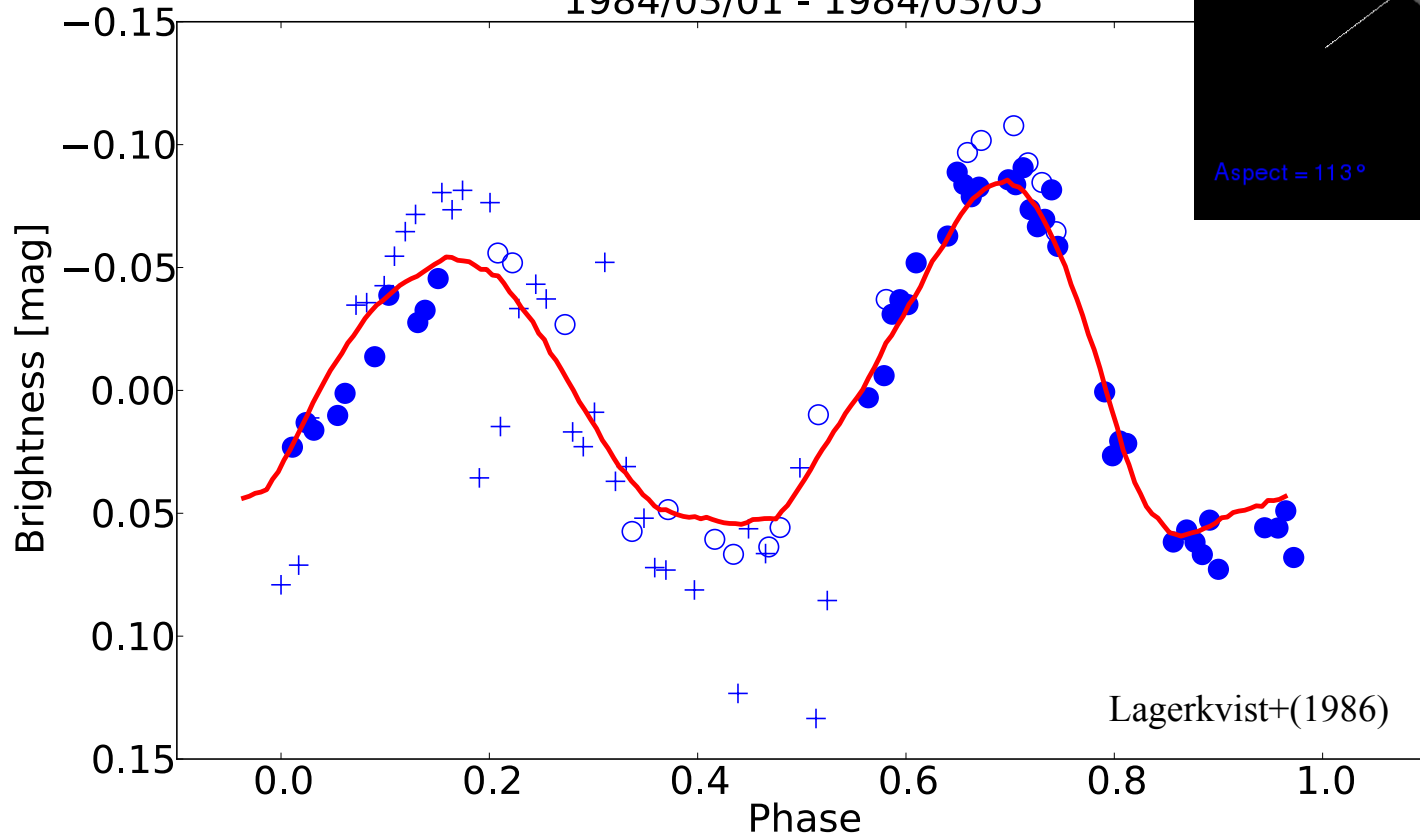
# 76 Freia $D=168[\text{km}]$ , $a=3.41[\text{AU}]$ , $e=0.163$ , $i=2.12^\circ$

76 Freia  
JD=2445760.6569

$\lambda = 140^\circ$   
 $\beta = 14^\circ$

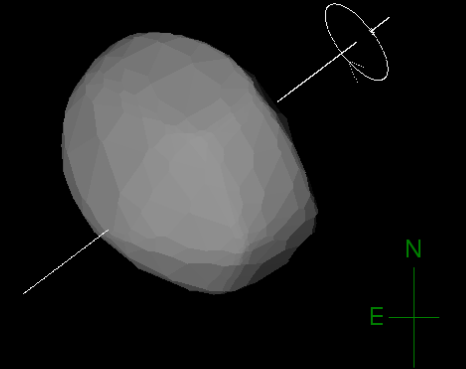
phase angle (STO):  $12.32^\circ$ - $11.34^\circ$

1984/03/01 - 1984/03/05



Aspect =  $113^\circ$

$P=9.973060$  h



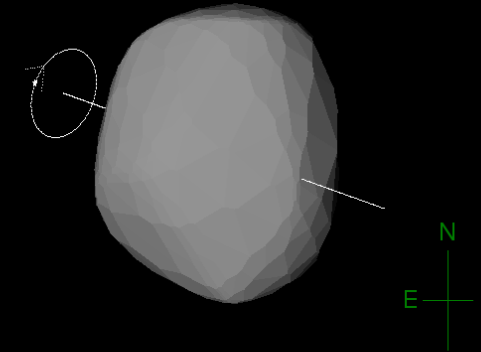


# 76 Freia D=168[km], a=3.41[AU], e=0.163, i=2.12°

76 Freia  
JD=2454442.6883

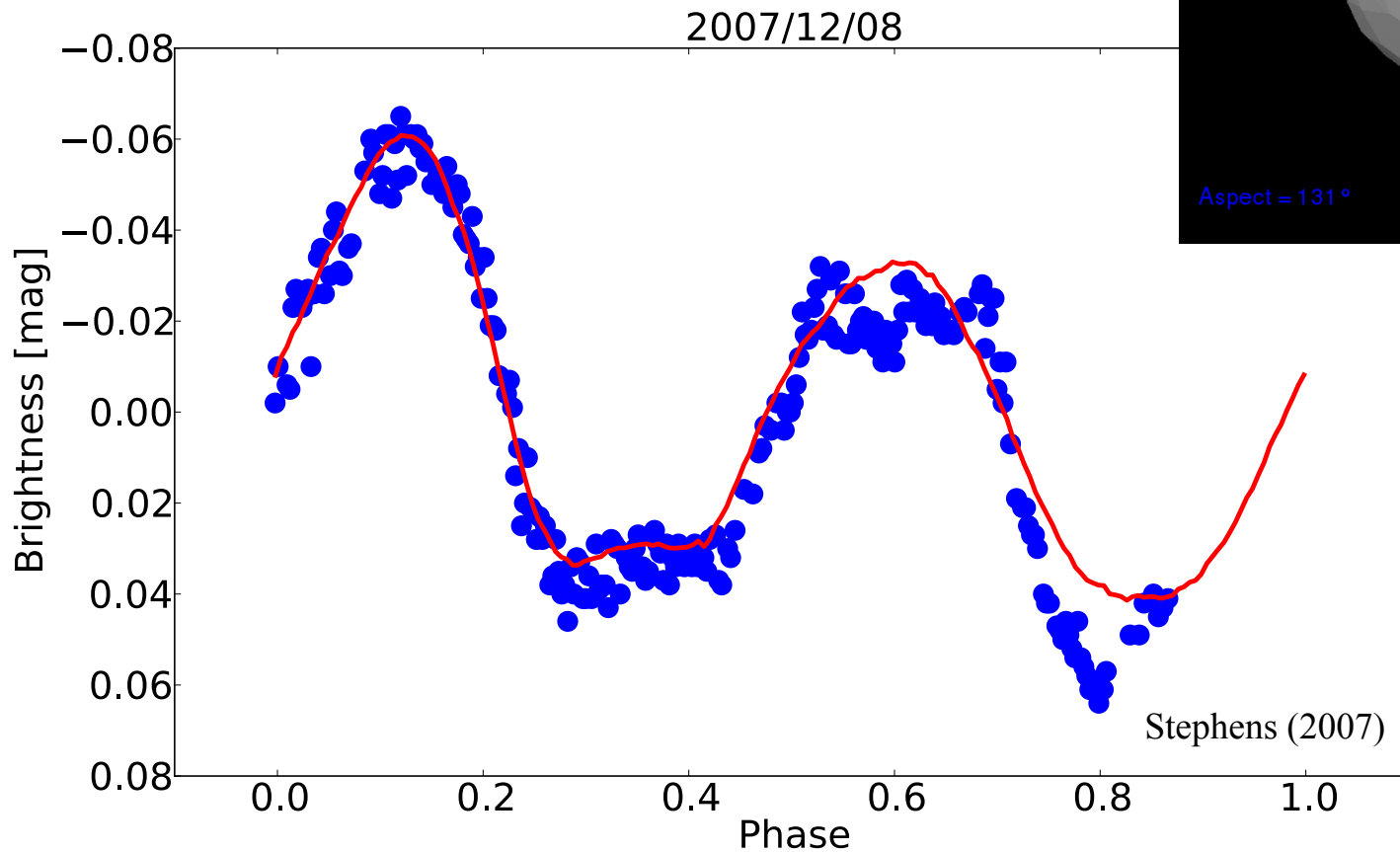
$\lambda = 140^\circ$   
 $\beta = 14^\circ$

phase angle (STO): 16.41°



Aspect = 131°

P=9.973060 h



# Summary

1. lightcurve inversion is a powerful method for determining physical characteristics of asteroids
    - observations match range of phase angles and epochs
  2. ISAM is incredibly useful for the comparison of asteroid shape models
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# Questions

