

Planetary Pairs In Our Solar System

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Abstract: Kepler’s laws of planetary motion and the Titus-Bode formula are results of observational data on the solar system. The latter points towards a definite geometry that governs the location of orbits of the planets and the former shows a definite geometric conservation law at work. Observational data [1] once again reveals the presence of a phenomenological but definite working of the solar system that fixes the locations of planetary orbits in pairs across the asteroid belt.

Keywords: numerical-solar system geometry, planetary systems, Titus-Bode formula, Kepler’s laws, interplanetary spacing.

Interplanetary spacing or planetary distribution in the solar system has provoked much speculation but a perfect theory or model has been elusive. Kepler’s laws [2] make it quite certain that planetary orbits follow a geometric conservation law because the square of the time period for the revolution of the planets is equal to the cube of their respective distances from the sun while the Titus-Bode formula [3] quite certainly predicts the mean distance of every planet’s orbit including the asteroids but is unfortunately wrong by 29% for Neptune and 95% for Pluto. The good part is that the Titus-Bode formula is extremely simple and determines the distances of planetary orbits by assigning a fixed whole number n to each planet in this formula:

$$R = 0.4 + 0.3 \cdot (2^n) \tag{1}$$

R is the mean ‘Titus-Bode’ distance of the planet from the sun in Astronomical Units (AU). The number n is unique for every planet and is in ascending order from Mercury ($n = -\infty$), Venus ($n = 0$), Earth ($n = 1$), and so on as shown in table 1 below. We will call n the ‘Titus-Bode number’. D will denote the real distances while distances returned by the pair planet relationship will be R.

Table 1.

Sectors	$S = 0$					$S = 1$				$S = 2$
Planets	Mercury	Venus	Earth	Mars	Astids	Jupiter	Saturn	Uranus	Neptune	Pluto
n	$-\infty$	0	1	2	3	4	5	6	7	8
N	1	2	3	4	-	5	6	7	8	9
Distance D	.387099	.72333 2	1.0	1.52 36	2.4	5.2025 61	9.5547	19.218 14	30.1095	39.44
Titus-Bode distance R	.4	.7	1.0	1.6	2.8	5.2	10.0	19.6	38.8	77.2
Error %	+3.333	-3.226	Nil.	+5.0 08	-	-.0492	+4.66	+1.987	+28.863	+95.7 4
R @ D						5.2380 535	9.5492	19.186 97	28.5225	39.61 4
Error %						+.682	-.057	-.1622	-5.271	+.443
R @ R						5.5003 948	9.5492	18.568 07	29.4731	40.93 4
Error %						+5.725	-0.057	-3.383	-2.114	+3.79

All distances in astronomical units (AU).

Dividing the planets into sectors represented by S , the rocky inner planets will be the sector zero planets and the gas giants will be the sector one planets. We will assign every planetary orbit a number N in ascending order starting from Mercury ($N=1$) to Pluto ($N=9$) as in table 1.

A careful glance at table 1 shows that the orbit length of Saturn ($N = 6$) to be about sixty times the distance between the sun and Earth. It also happens that Saturn and Earth are both in the second orbits from their common sector border (which should be where the asteroids are). This relation,

$$D_{N=6} = D_{N=3} \cdot (60/2\pi) \quad (2),$$

gets extended to all planets in pairs by virtue of the positions of their orbits from the common border of their sectors. The rule to form pairs across the asteroids is

$$N_{S=0} + N_{S=1} = 9 \quad (3).$$

The general relationship between trans-asteroids planetary pairs emerges as,

$$R_{S=1} = D_{S=0} \cdot (10^{2N-11}) \cdot (6^{13-2N}) / 2\pi \quad (4).$$

The basic form of this relationship is

$$R_{S=1} = D_{S=0} \cdot (10^a) (6^b) / 2\pi \quad (5).$$

Here the values of a and b change by increments of $+2$ and -2 respectively, such that $a + b = 2$. For the Earth-Saturn pair a , b , and n have the value of 1.

This relationship does manage to get rid of the huge errors in the Titus-Bode formula for Neptune. As for Pluto, it fits in the general relationship if we assume that its orbit is in another sector where $S = 2$ and is therefore paired with Neptune, which in turn is paired with Mercury making a threesome (see table 2 below). In the modified versions of equations 3 and 4, we see that there is a physical representation of the planet's sector:

$$R_{S \geq 1} = D_{S=0} \cdot (10^{2N-11}) \cdot (6^{13-2N}) / 2^S \pi \quad (6),$$

$$R_{S \geq 1} = D_{S=0} \cdot (10^a) (6^b) / 2^S \pi \quad (7).$$

The values of a and b continue normally. This gives the distance of Pluto's orbit very accurately.

Table 2.

$4\pi D_{\text{Pluto}} = D_{\text{Mercury}} 10^{12}/60^5$
$2\pi D_{\text{Neptune}} = D_{\text{Mercury}} 10^8/60^3$
$2\pi D_{\text{Uranus}} = D_{\text{Venus}} 10^4/60^1$
$2\pi D_{\text{Saturn}} = D_{\text{Earth}} 10^0/60^{-1}$
$2\pi D_{\text{Jupiter}} = D_{\text{Mars}} 10^{-4}/60^{-3}$

The simplest representations of each pair's relationship.

When $D_{S=0}$ is replaced by $R_{S=0}$ in 6 and 7, the results are still very accurate. The inaccuracies in determining distances of the sectors one and two orbits are mostly due to the related inaccuracies in the Titus-Bode formula, as we can see in table 1.

We may conclude that there seems to be a possibility that solar systems have planets that occur in pairs or in threes across sectors occupied by similar or homogeneous planets (a sector of gas giants with a sector of rocky planets and possibly a sector of 'ice ball' planets). In our own system, sector two is either incomplete or there are undiscovered ice balls for $N = 10, 11,$ and 12 located at about 198 AU, 789 AU, and 2193 AU respectively. If Pluto's orbital plane is 17.17° the inclination is typically

the norm for sector two, $N = 10, 11,$ and 12 should have increasingly inclined orbital planes. There could also be a possibility that the anomalous retrograde rotations of the Venus-Uranus pair are not entirely a coincidence.

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