

ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΑΤΡΩΝ

ΤΜΗΜΑ ΦΥΣΙΚΗΣ

ΓΡΑΦΙΚΕΣ ΠΑΡΑΣΤΑΣΕΙΣ ΣΤΟ ΛΟΓΙΣΜΙΚΟ SciDAVis

ΕΡΓΑΣΤΗΡΙΟ ΦΥΣΙΚΗΣ Ι

Δ. ΚΟΡΦΙΑΤΗΣ

ΤΑΛΑΝΤΩΣΗ ΑΠΛΟΥ ΕΚΚΡΕΜΟΥΣ

Η περίοδος δίνεται από την σχέση:

$$T = 2\pi \sqrt{\frac{L}{g}} \Rightarrow T^2 = \frac{4\pi^2}{g} L$$

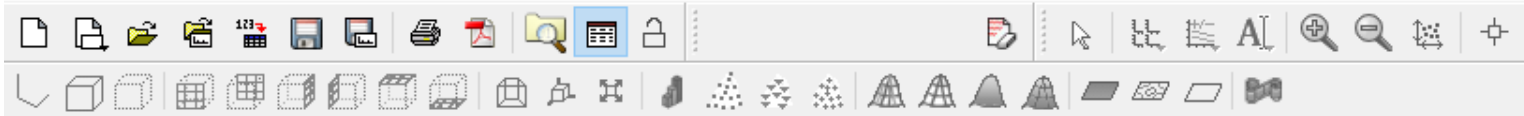
Δηλαδή: $T^2 = A \cdot L + B$

Έχουμε στη διάθεση μας πειραματικά σημεία (L, T²).
Θα εφαρμόσουμε τη μέθοδο των ελαχίστων τετραγώνων για να υπολογίσουμε τα A, B.

ΕΙΣΑΓΩΓΗ ΔΕΔΟΜΕΝΩΝ

SciDAVis - untitled - [Table1]

File Edit View Scripting Plot Analysis Table Windows Help



results Log

	1[X]	2[Y]
1	0,2	8,96
2	0,25	9,98
3	0,3	10,87
4	0,35	11,8
5	0,4	12,63
6	0,45	13,42
7	0,52	14,41
8	0,58	15,19
9	0,65	16,12
10	0,7	16,65
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

ΠΡΟΣΘΗΚΗ ΣΤΗΛΗΣ

The screenshot shows a software interface with a menu bar (File, Edit, View, Scripting, Plot, Analysis, Table, Windows, Help) and a toolbar. Below the toolbar is a 'Results Log' section. The main area contains a table with two columns, labeled 1[X] and 2[Y]. The table has 13 rows, with the 10th row selected. The 'Table' menu is open, showing various options, with 'Add Column' highlighted in blue.

	1[X]	2[Y]
1	0,2	8,96
2	0,25	9,98
3	0,3	10,87
4	0,35	11,8
5	0,4	12,63
6	0,45	13,42
7	0,52	14,41
8	0,58	15,19
9	0,65	16,12
10	0,7	16,65
11		
12		
13		

Table Menu Options:

- Set Column(s) As
- Fill Selection with
- Show Comments
- Hide Controls F12
- Formula Edit Mode
- Edit Column Description
- Change Type & Format Ctrl+Alt+O
- Clear Table
- Sort Table
- Assign Formula Alt+Q
- Recalculate Ctrl+Return
- Add Column**
- Dimensions
- Go to Cell Ctrl+Alt+G
- Export ASCII...
- Convert to Matrix

ΕΙΣΑΓΩΓΗ ΤΙΜΩΝ ΑΠΟ ΤΥΠΟ

The image shows a spreadsheet interface with a list of values in column 2 and a formula bar. The values in column 2 are: 8,96, 9,98, 10,87, 11,8, 12,63, 13,42, 14,41, 15,19, 16,12, 16,65. The formula bar contains the formula $col("2")/10$. The 'Apply' button is highlighted, and a tooltip indicates 'Apply the formula to all selected cells'.

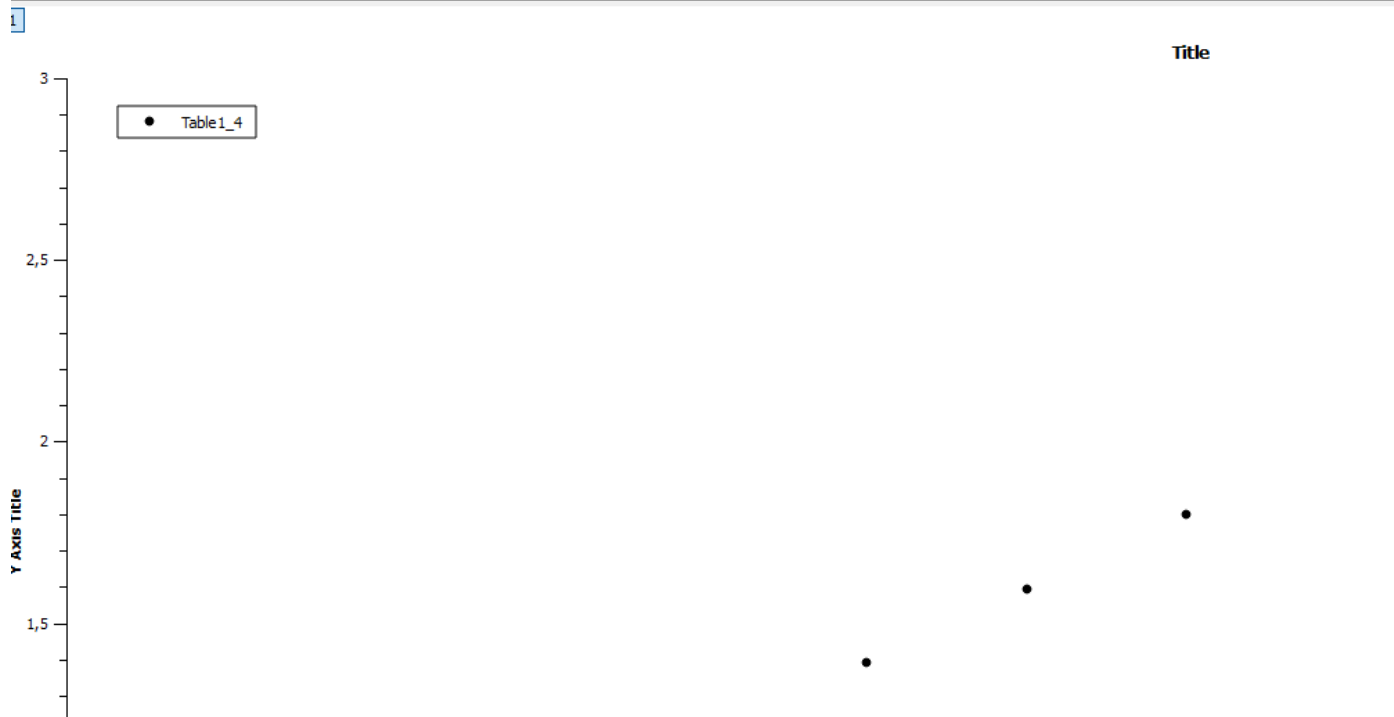
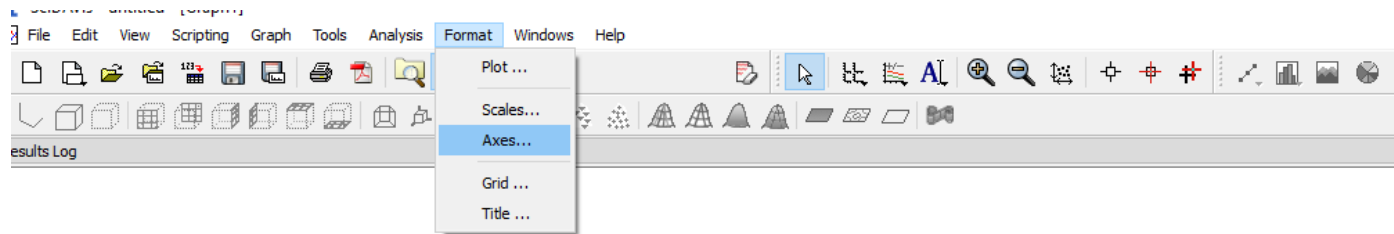
Description	Type	Formula
		$col("2")/10$

ΚΑΤΑΣΚΕΥΗ ΔΙΑΓΡΑΜΜΑΤΟΣ

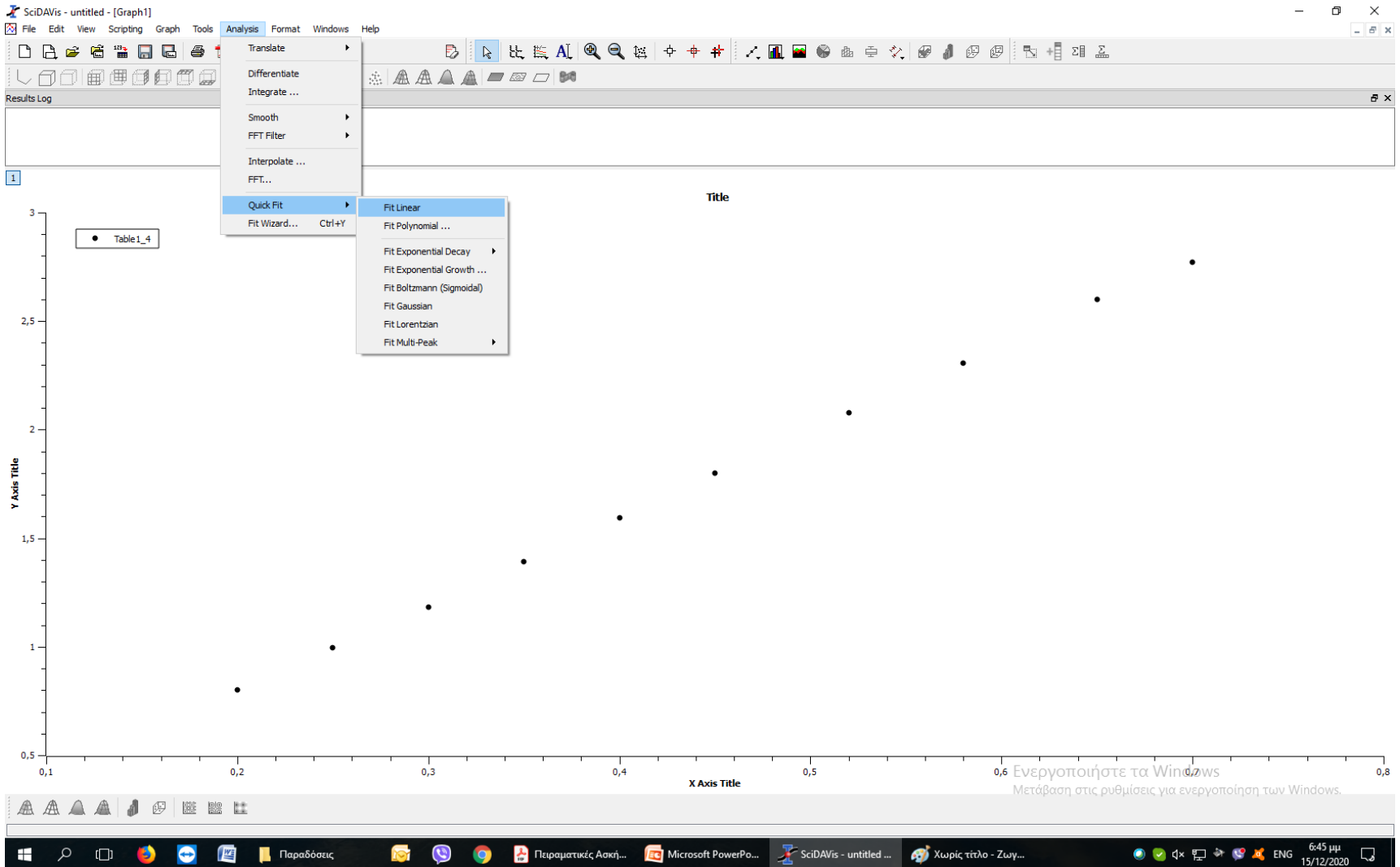
The screenshot shows a software interface with a menu bar (File, Edit, View, Scripting, Plot, Analysis, Table, Windows, Help) and a toolbar. The 'Plot' menu is open, displaying various chart types: Line, Scatter, Line + Symbol, Special Line/Symbol, Vertical Bars, Horizontal Bars, Area, Pie, Vectors XYYX, Vectors XYAM, Statistical Graphs, Panel, and 3D Plot. Below the menu, a data table is visible with columns 1[X], 2[Y], and 4[Y]. The table contains numerical data for rows 0 through 5.

	1[X]	2[Y]	4[Y]
0	0,2	8,96	0,802816
1	0,25	9,98	0,996004
2	0,3	10,87	1,18157
3	0,35	11,8	1,3924
4	0,4	12,63	1,59517
5	0,45	13,42	1,80096
	0,52	14,41	2,07648
	0,58	15,19	2,30736
	0,65	16,12	2,59854
	0,7	16,65	2,77222

ΡΥΘΜΙΣΕΙΣ ΑΞΟΝΩΝ



ΓΡΑΜΜΙΚΗ ΠΡΟΣΑΡΜΟΓΗ

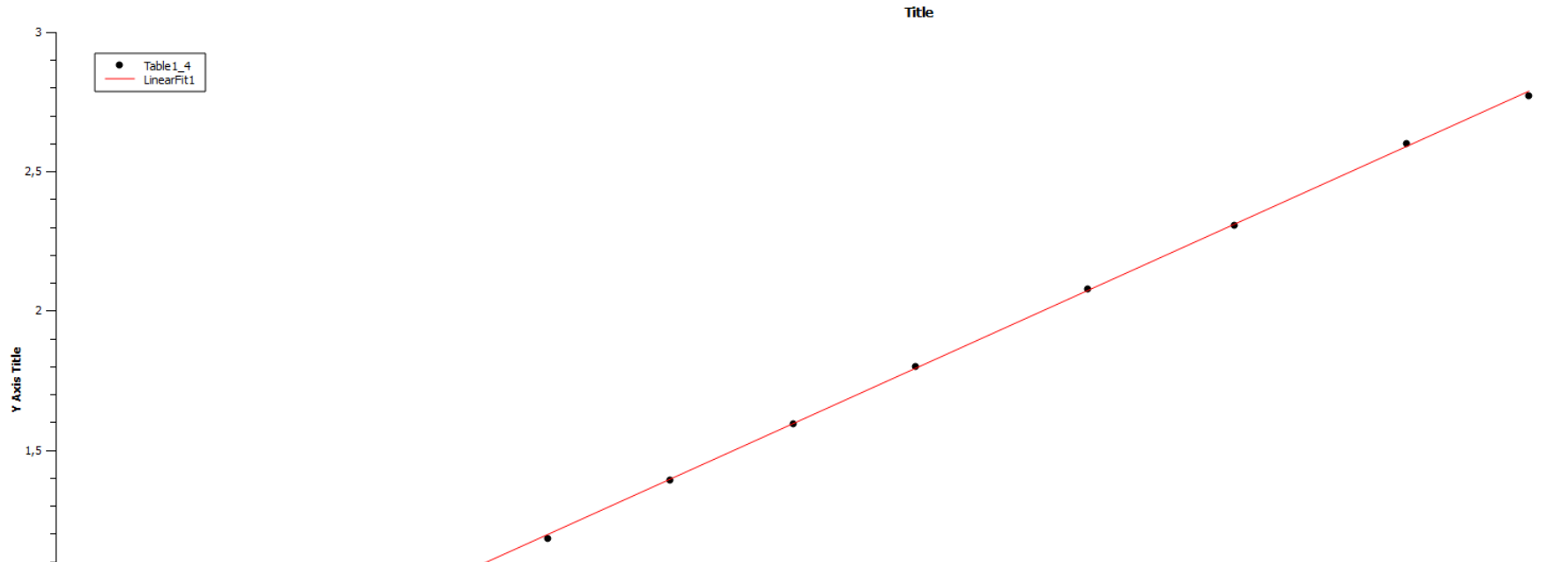


ΕΥΘΕΙΑ ΕΛΑΧΙΣΤΩΝ ΤΕΤΡΑΓΩΝΩΝ

Results Log

Linear regression fit of dataset: Table_1_7, using function: $A \cdot X + B$
Y standard errors: Unknown
From x = 0,2 to x = 0,7
B (y-intercept) = 0,00252259754601257 +/- 0,00838214917503529
A (slope) = 3,9768879601227 +/- 0,0178838132298392

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ΑΠΟΤΕΛΕΣΜΑΤΑ

Από τη ΜΕΤ βρήκαμε:

$$A \pm \delta A = (3.98 \pm 0.02) \frac{s^2}{m} \qquad B \pm \delta B = (0.003 \pm 0.008) s^2$$

$$g = \frac{4\pi^2}{A} = \frac{4 \cdot 3.1416^2}{3.98} = 9.919246 \dots \approx 9.919 \frac{m}{s^2}$$

Από διάδοση σφάλματος:

$$\delta g = \left| \frac{-4\pi^2}{A^2} \cdot \delta A \right| = \frac{4 \cdot 3.1416^2}{3.98^2} \cdot 0.02 = 0.0498 \dots \approx 0.05 \frac{m}{s^2}$$

Τελικά: $g \pm \delta g = (9.92 \pm 0.05) \frac{m}{s^2}$