	TEAM: Blue	
Hit that ball!	Belgium	Margot Vandenberghe Lowie Ranson Arthur Dejonckheere Britt Braekevelt
	France	Vincent Maubras Verapat Panma Arnaud Avaullée
	Italy	Ilaria Jussi Raffaele Alice
EXPERIMENT: SPEED IN DIFFERENT WAYS OF PUSHING A BALL		

1. ORIENTATION

1.1. **Research question:**

Does a specific way of throwing the ball up have an effect on the speed and the trajectory of that ball?

Sub-questions:

Does the ball go faster if we throw it up while we play the ball underhand, smash, or just by pushing the ball on a normal way?

1.2. **Hypothesis**

We think that the ball will go faster and further if we jump while we play the ball.

2. PREPARATION

Material:

- Volleyball
- Tracker
- Ruler

- Tape
- Mobile phone

Method:

1. Calibrate
2. Start with throwing the ball up and play it overhand

3. Do this again but play the ball underhand

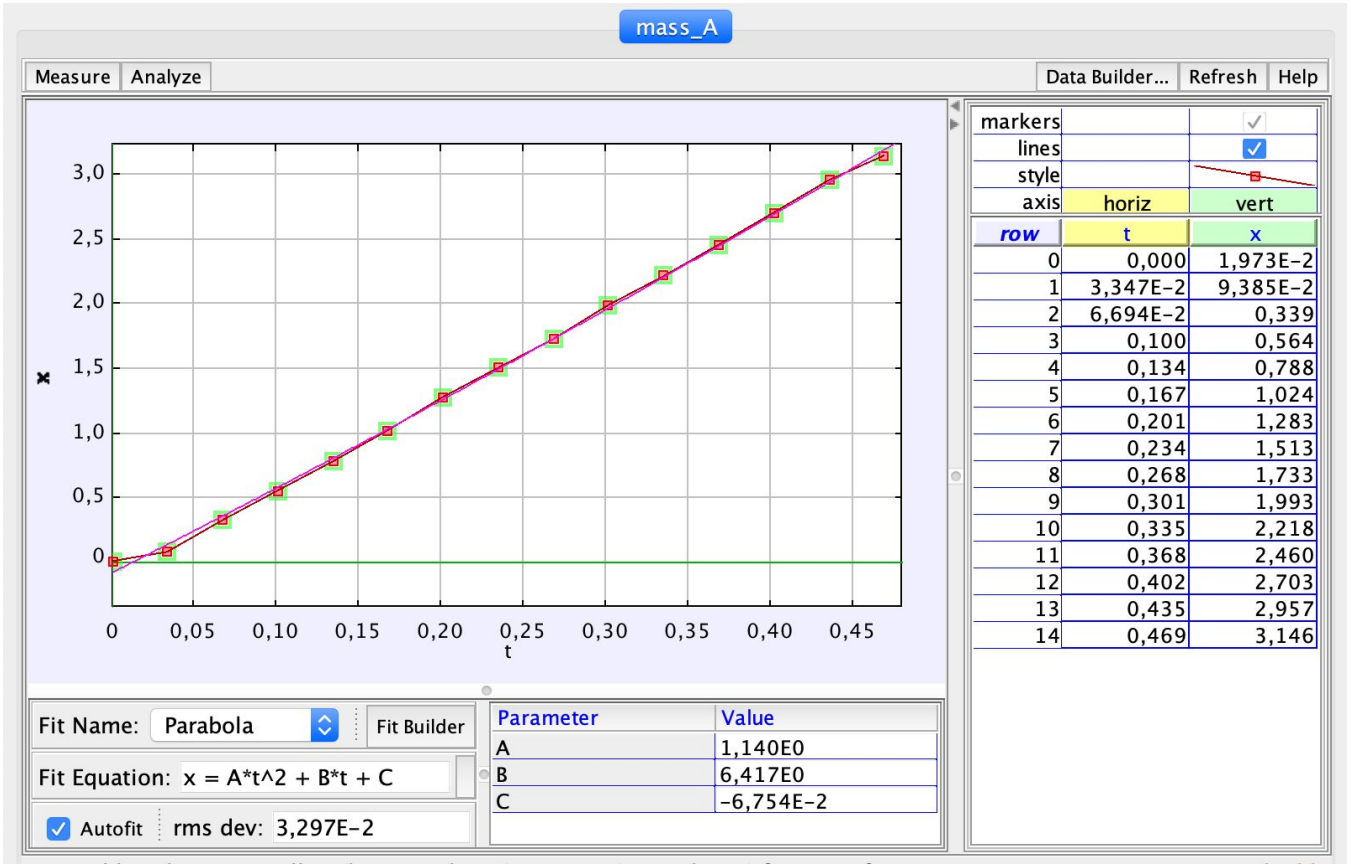
4. Finally throw the ball up and smash it

5. Film it and put it on the drive
6. Use tracker.

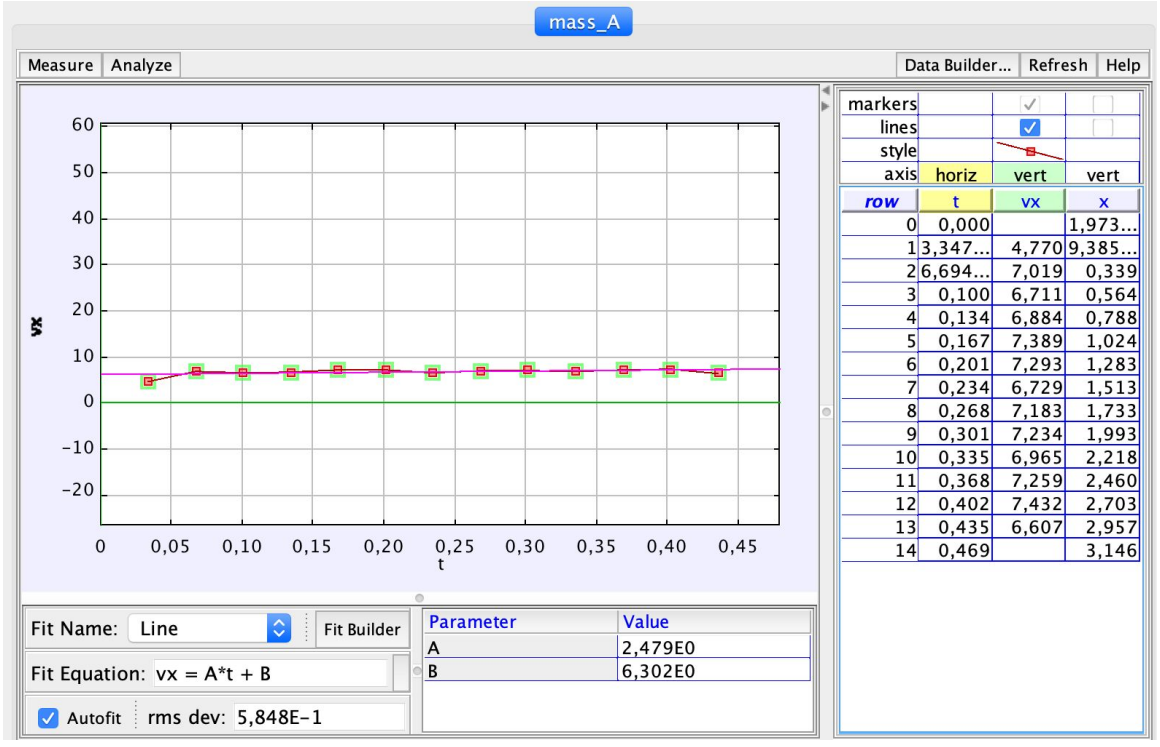
3. DATA ANALYSIS and DISCUSSION

Observations and Measurements:

Attempt 1 of the French group analyzed by the Belgian team



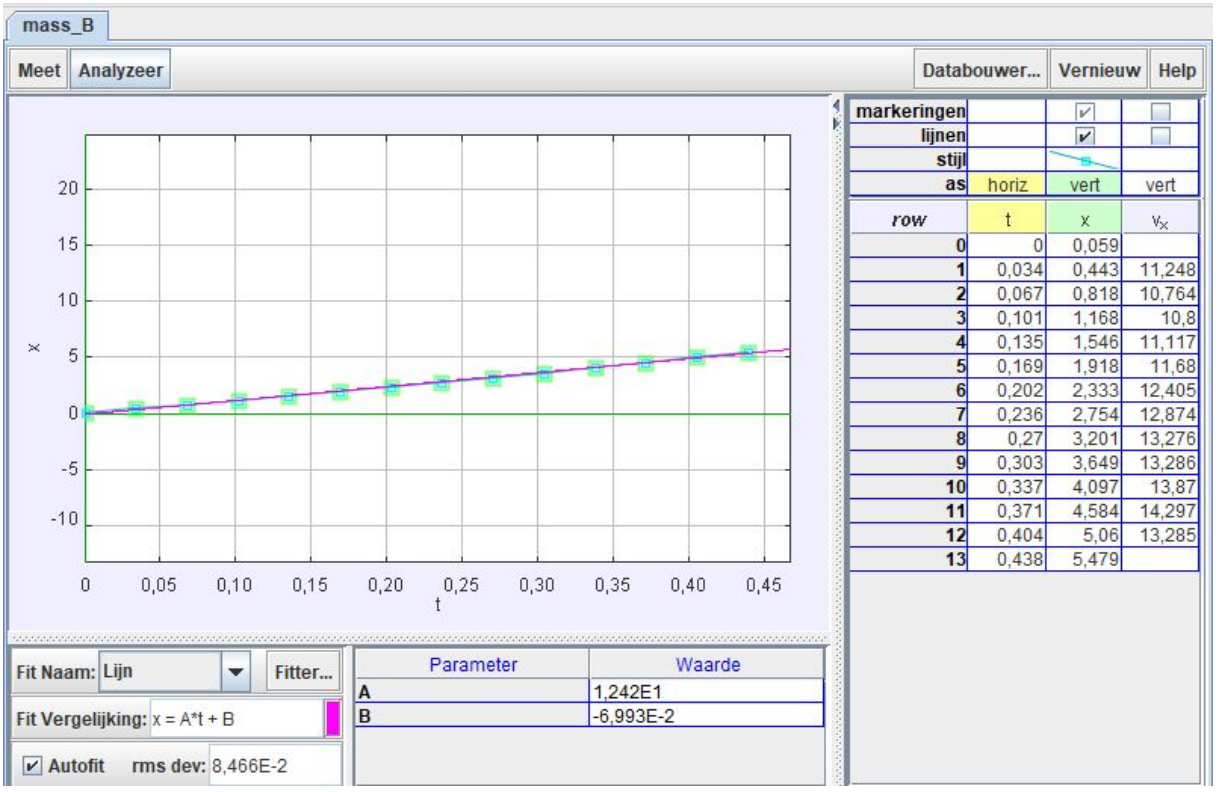
x(t) = 1,14 t^2 + 6,42 t - 0,068

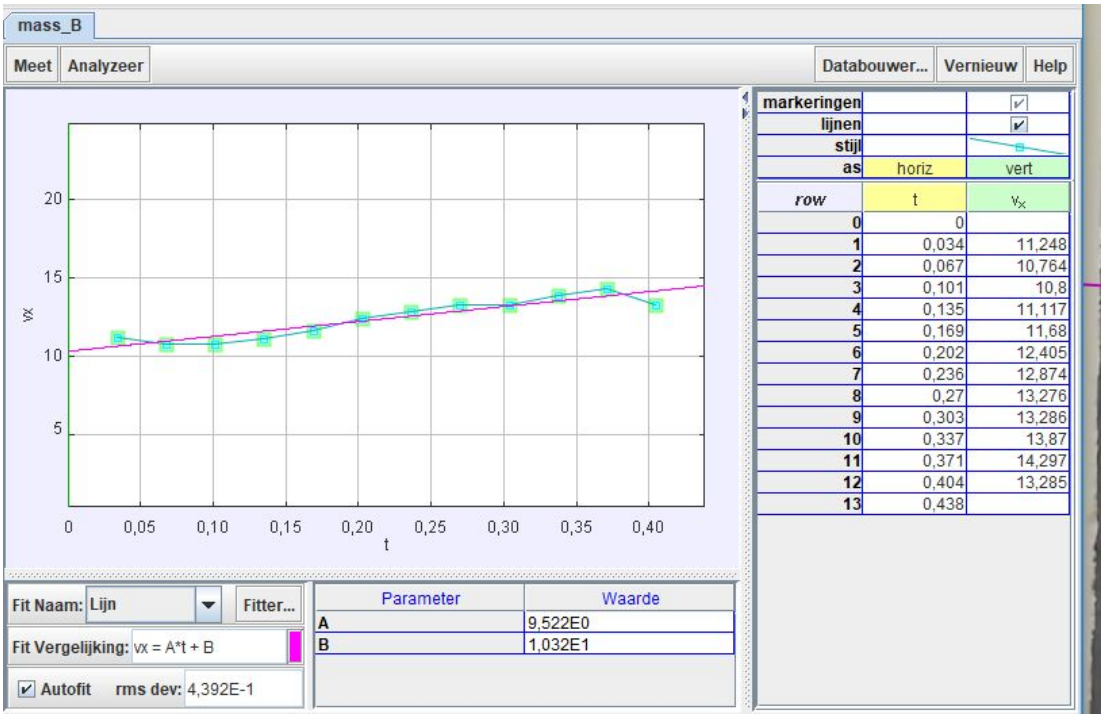


vx(t) = 2,48 t + 6,30

Experiment

Attempt 2 of the French group analyzed by the Belgian team





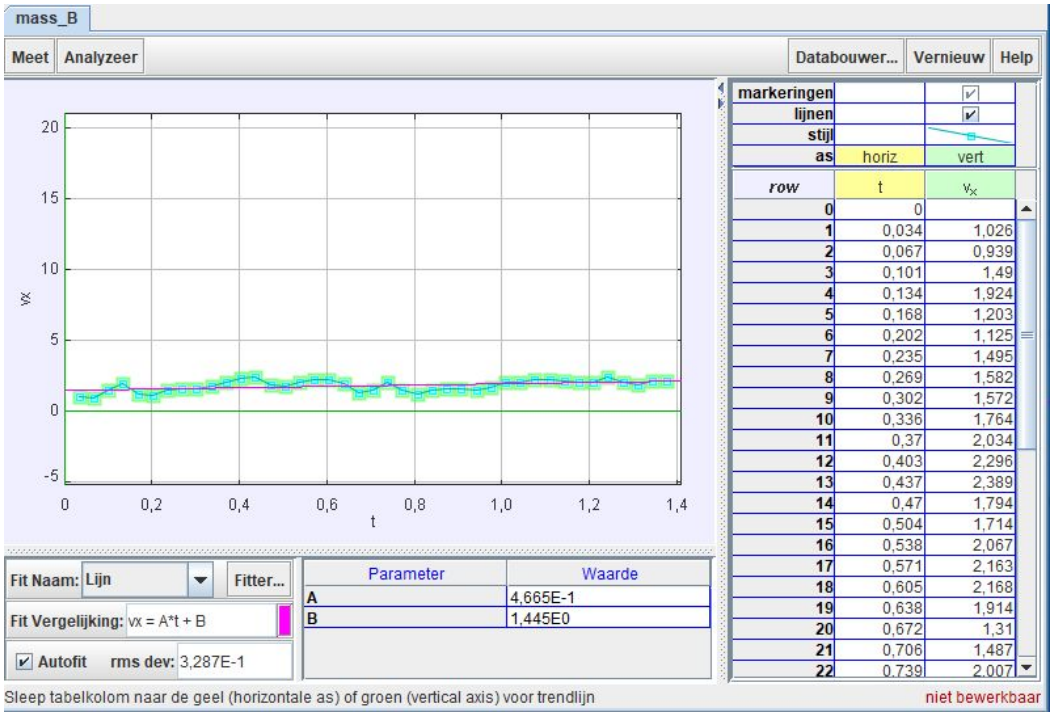
x(t) = 12,4t - 0,0699

vx(t) = 9,52 t + 1,03

Experiment

Attempt 3 of the French group analyzed by the Belgian team

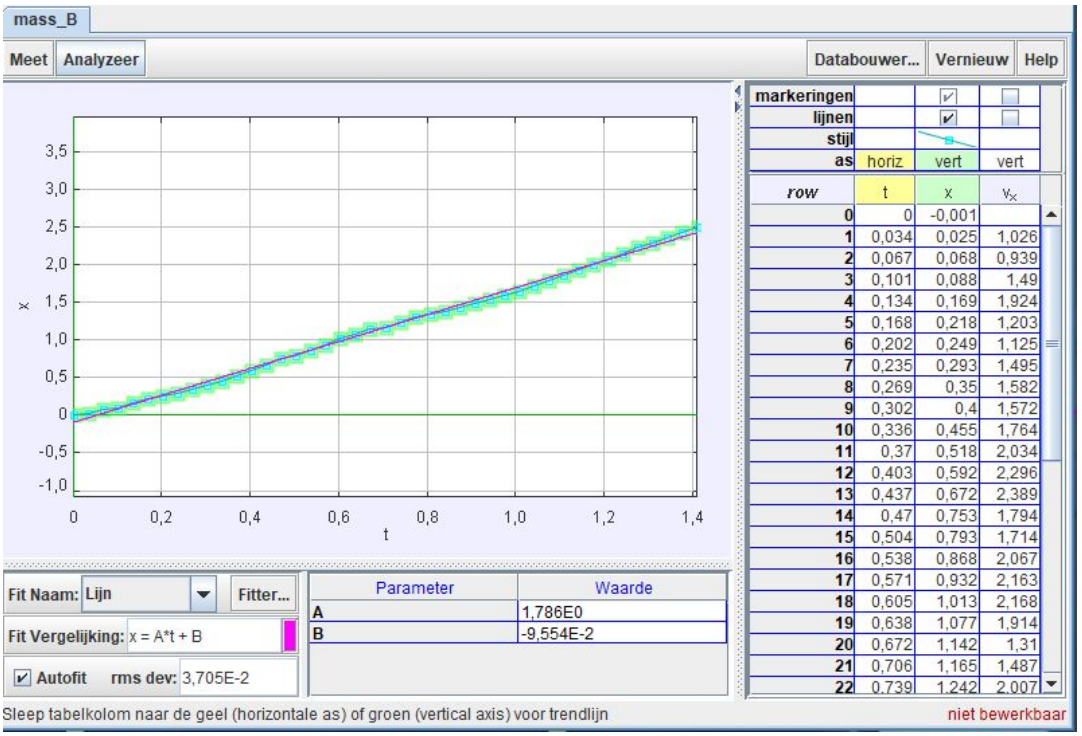
x(t) = 0,493 t + 1,73



vx(t) = 0,467 t + 1,45

Experiment

Attempt 4 of the French group analyzed by the Belgian team

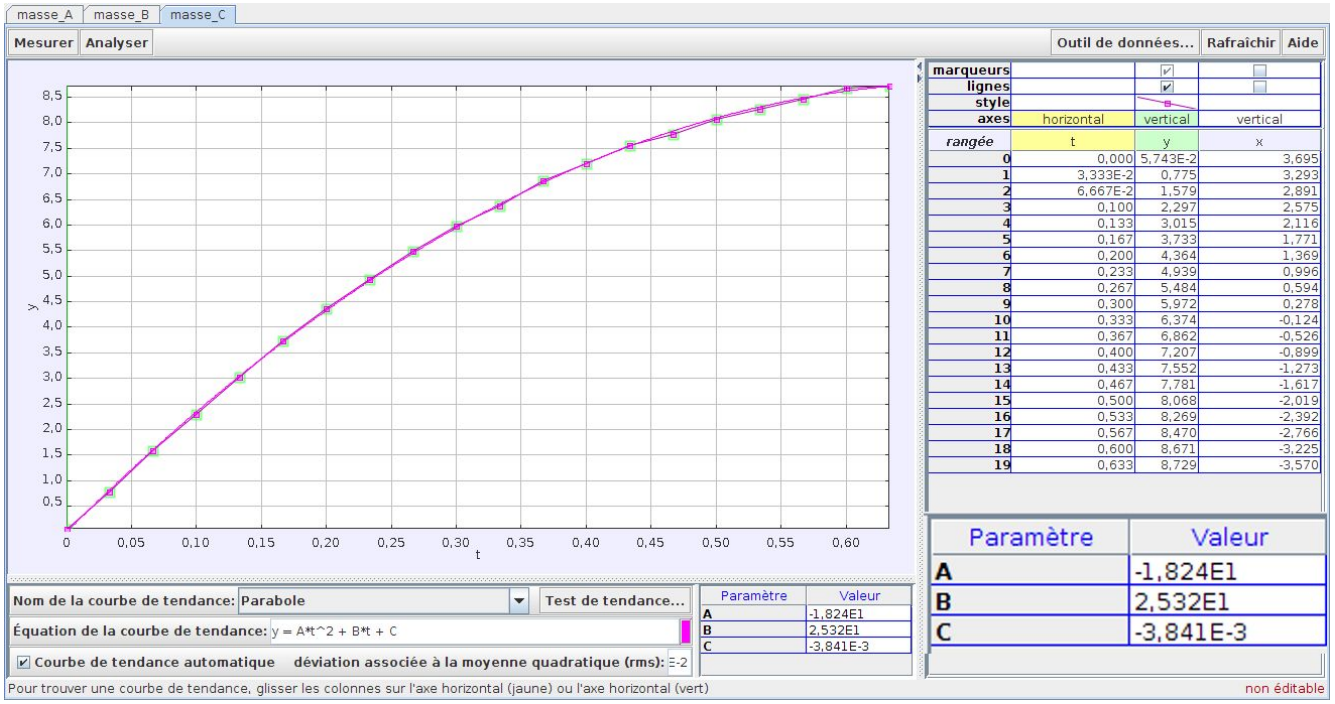


x(t) = 1,79 t - 0,0955

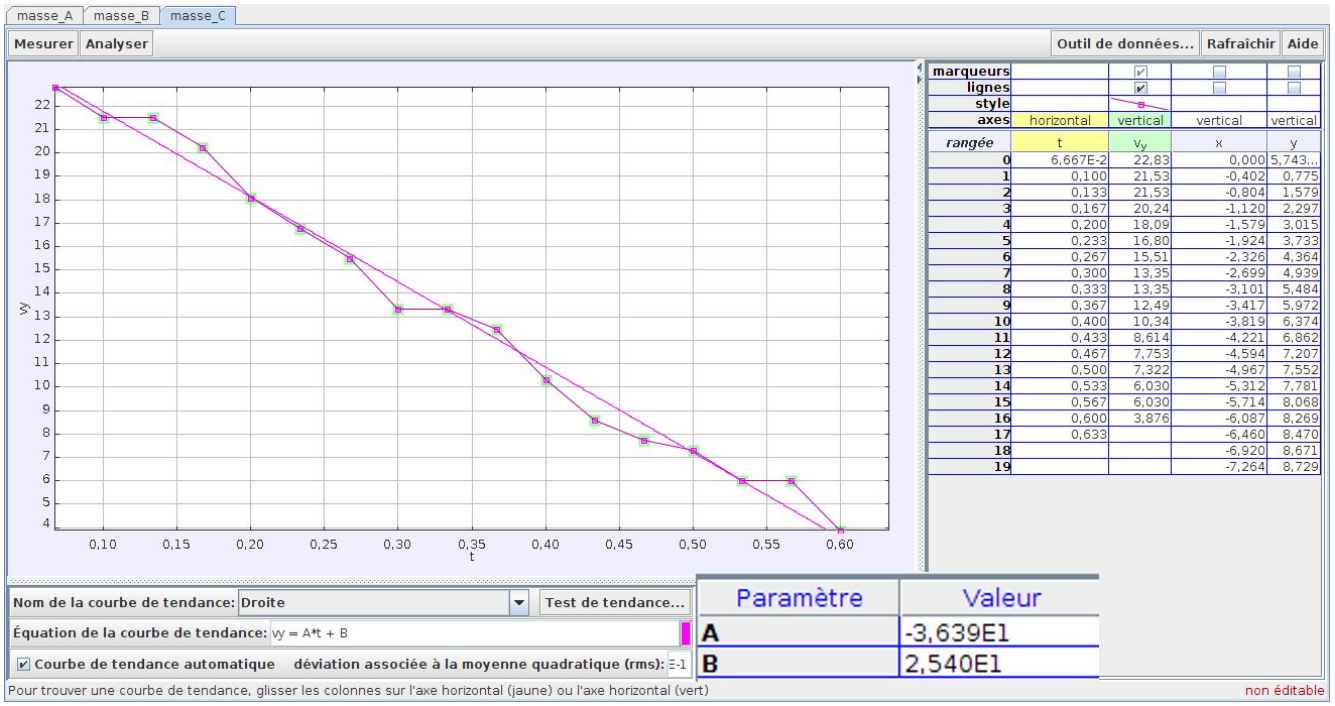
vx(t) = 0,494 t + 1,73

Experiment

Bagher attempt from Italy analysed by French



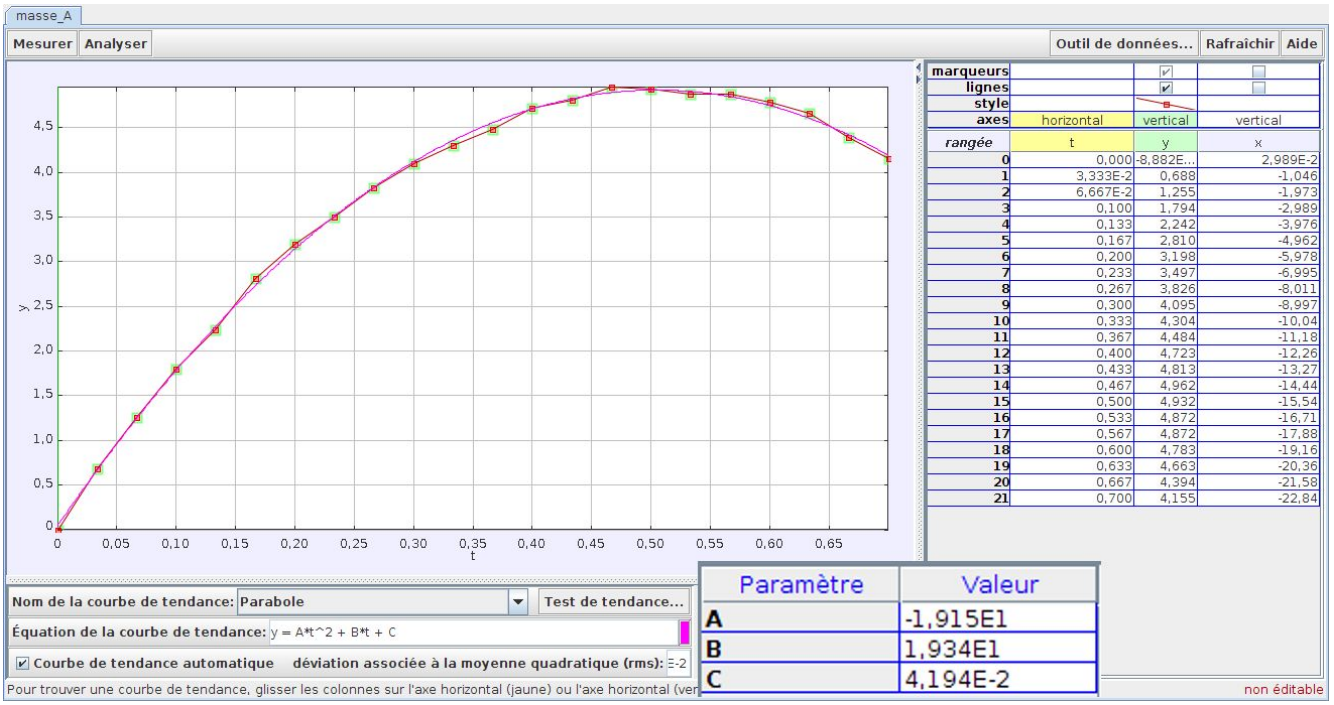
x(t) = -18,2 t^2 + 25,3 t - 0,00384



vx(t) = -36,4 t + 25,4

Spike attempt from Italy analysed by French

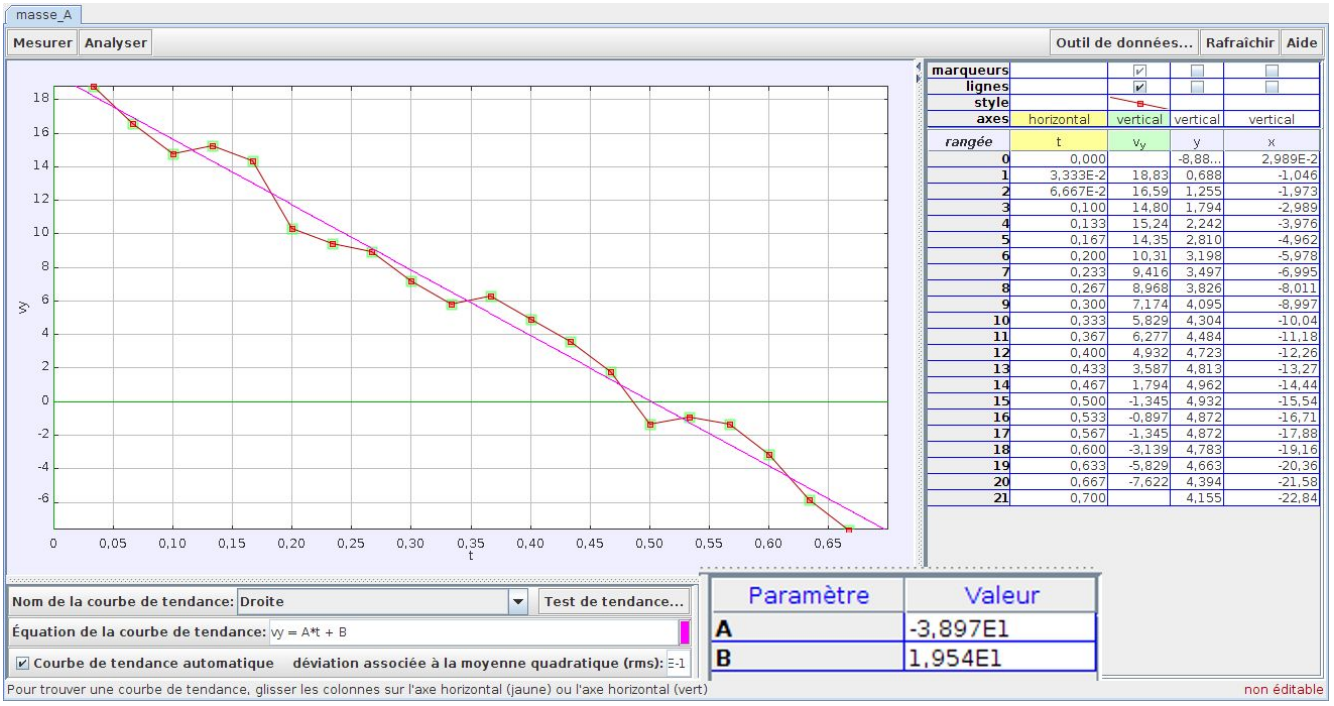
Experiment



marqueurs		☑	☐
lignes		☑	☐
style			
axes	horizontal	vertical	vertical
rangée	t	y	x
0	0,000	-8,882E...	2,989E-2
1	3,333E-2	0,688	-1,046
2	6,667E-2	1,255	-1,973
3	0,100	1,794	-2,989
4	0,133	2,242	-3,976
5	0,167	2,810	-4,962
6	0,200	3,198	-5,978
7	0,233	3,497	-6,995
8	0,267	3,826	-8,011
9	0,300	4,095	-8,997
10	0,333	4,304	-10,04
11	0,367	4,484	-11,18
12	0,400	4,723	-12,26
13	0,433	4,813	-13,27
14	0,467	4,962	-14,44
15	0,500	4,932	-15,54
16	0,533	4,872	-16,71
17	0,567	4,872	-17,88
18	0,600	4,783	-19,16
19	0,633	4,663	-20,36
20	0,667	4,394	-21,58
21	0,700	4,155	-22,84

Paramètre	Valeur
A	-1,915E1
B	1,934E1
C	4,194E-2

x(t) = -19,2 t^2 + 19,3 t + 0,0419



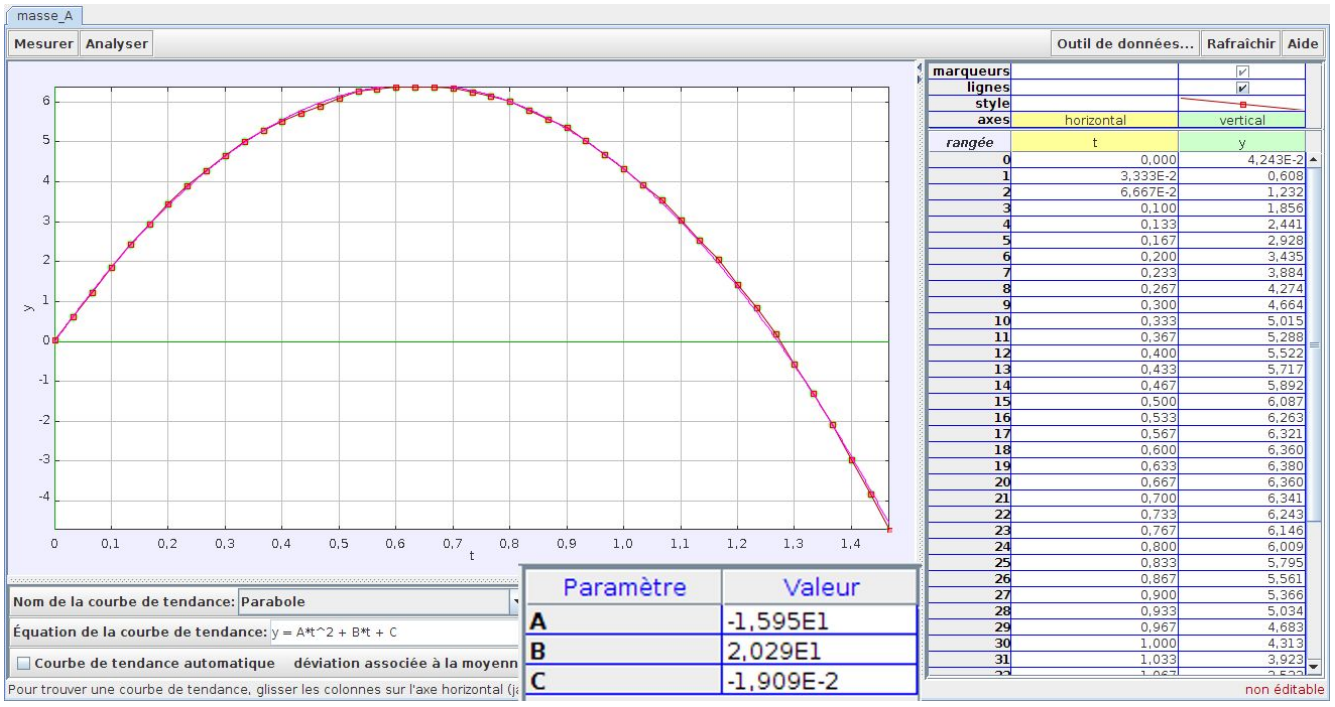
marqueurs		☑	☐	☐
lignes		☑	☐	☐
style				
axes	horizontal	vertical	vertical	vertical
rangée	t	v_y	y	x
0	0,000		-8,88...	2,989E-2
1	3,333E-2	18,83	0,688	-1,046
2	6,667E-2	16,59	1,255	-1,973
3	0,100	14,80	1,794	-2,989
4	0,133	15,24	2,242	-3,976
5	0,167	14,35	2,810	-4,962
6	0,200	10,31	3,198	-5,978
7	0,233	9,416	3,497	-6,995
8	0,267	8,968	3,826	-8,011
9	0,300	7,174	4,095	-8,997
10	0,333	5,829	4,304	-10,04
11	0,367	6,277	4,484	-11,18
12	0,400	4,932	4,723	-12,26
13	0,433	3,587	4,813	-13,27
14	0,467	1,794	4,962	-14,44
15	0,500	-1,345	4,932	-15,54
16	0,533	-0,897	4,872	-16,71
17	0,567	-1,345	4,872	-17,88
18	0,600	-3,139	4,783	-19,16
19	0,633	-5,829	4,663	-20,36
20	0,667	-7,622	4,394	-21,58
21	0,700		4,155	-22,84

Paramètre	Valeur
A	-3,897E1
B	1,954E1

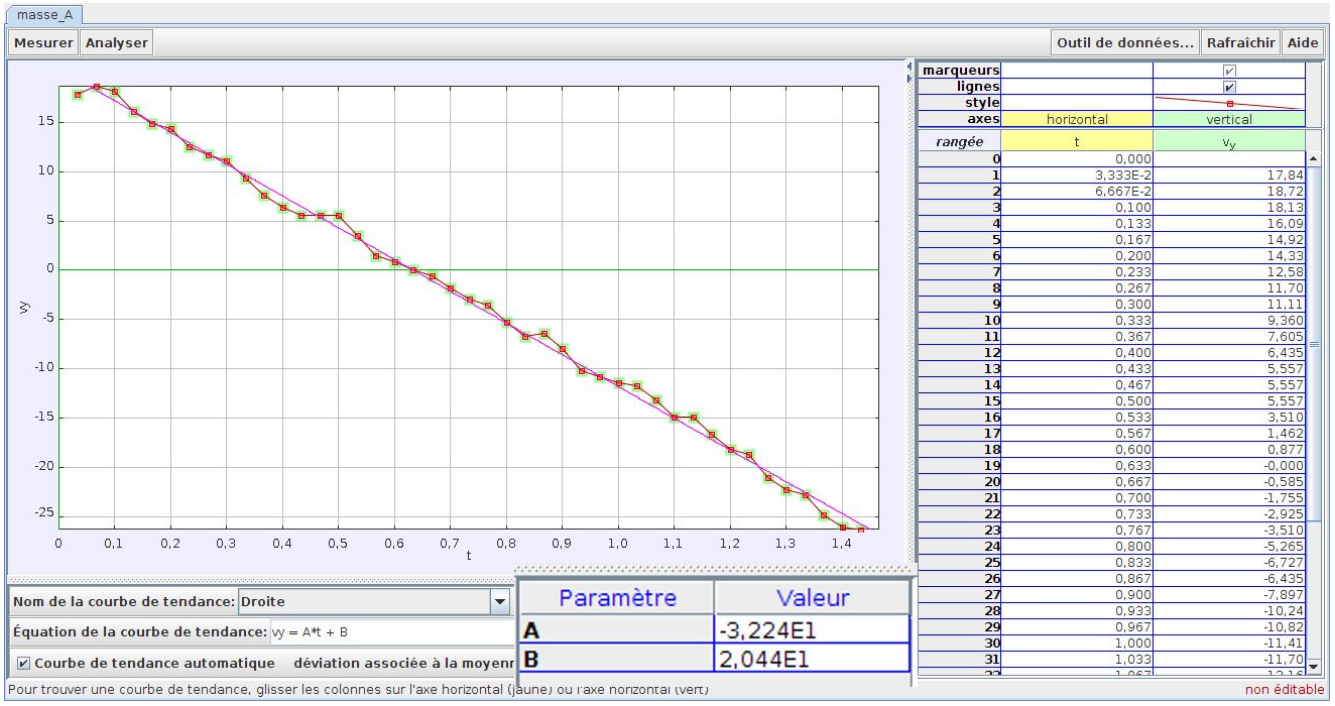
vx(t) = -39,0 t + 19,5

Warmup attempt from Italy analysed by French

Experiment



x(t) = -16,0 t^2 + 20,3 t - 0,0191

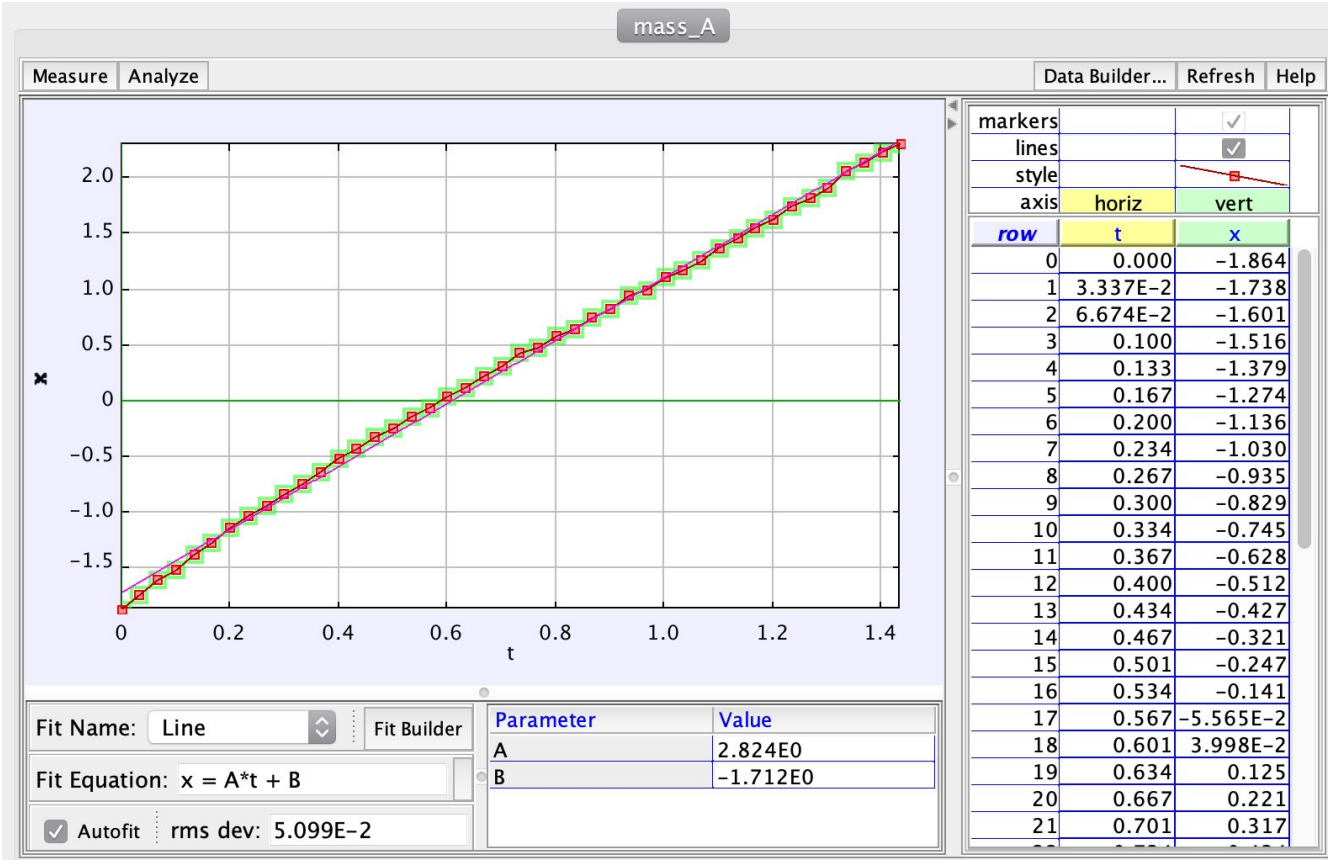


vx(t) = -32,2 t + 20,4

Experiment

Belgian experiment analyzed by Italian

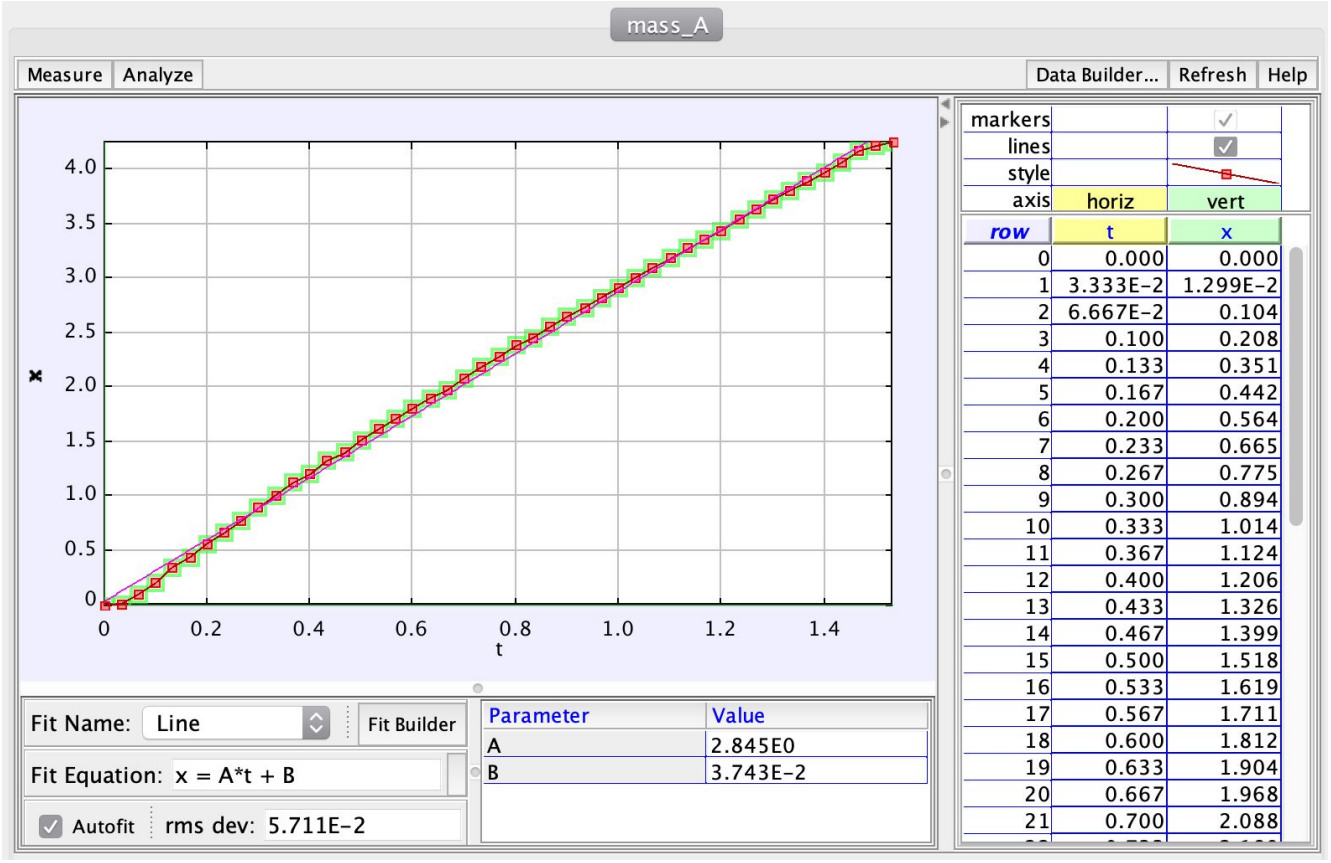
Attempt 1 of the Belgian group analyzed by the Italian group



x(t) = 2,82 t - 1,71

Attempt 2 of the Belgian group analyzed by the Italian group

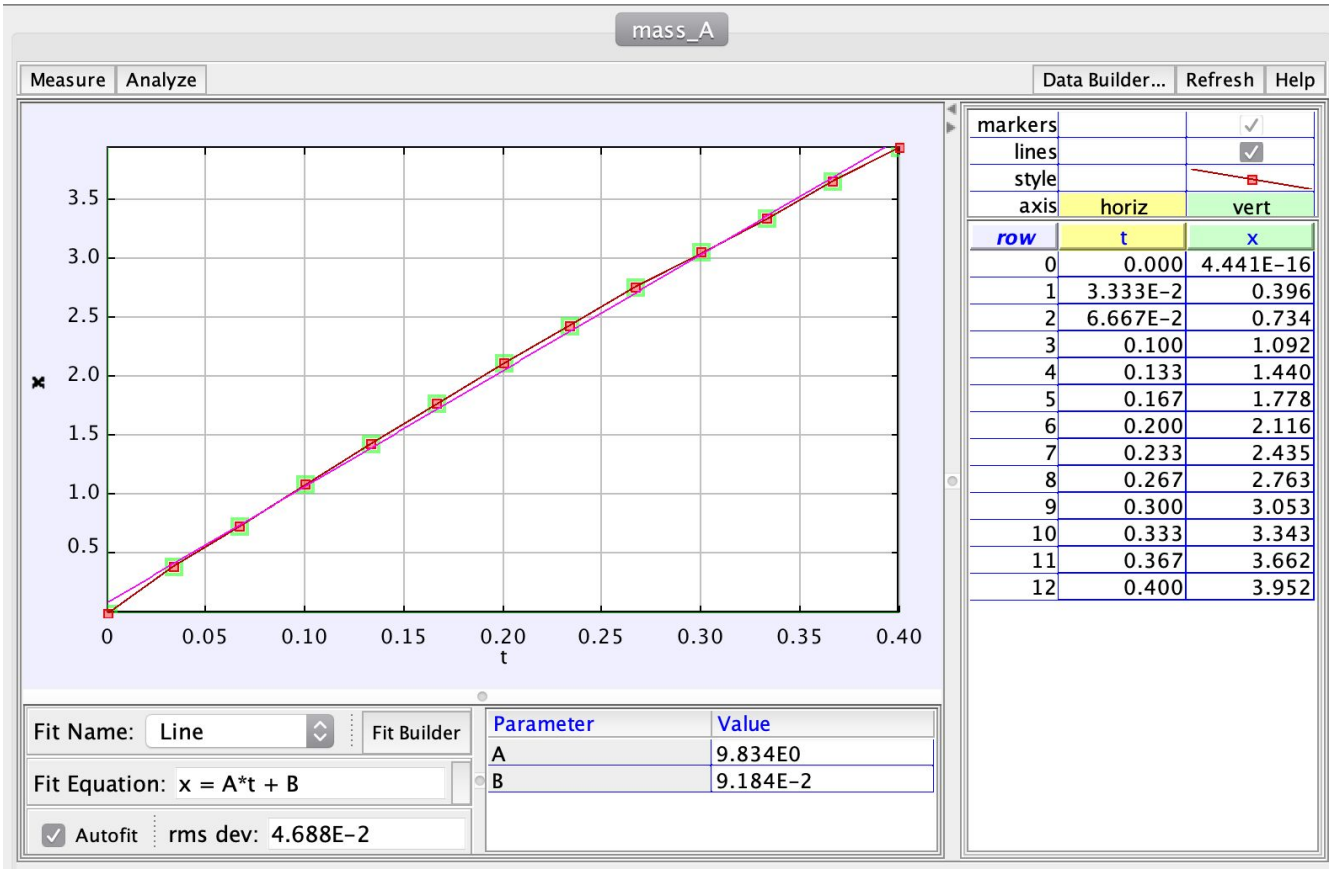
Experiment



x(t) = 2,85 t + 0,037

Experiment

Attempt 3 by the Belgian group analyzed by the Italian group



x(t) = 9,834 t + 0,091

Discussion:

a. We can see in the different results that by smashing the ball, the speed is a lot bigger than when you just play the ball overhand or underhand.
b. made by French team on Italian analysis of Belgian experiments

At the first experiment, the equation is x(t) = 2,82 t - 1,71 .

What this ?:

We can see that is a overhand hit.

At the second experiment, the equation is x(t) = 2,85 t + 0,037

What is that ?:

We can see that is a underhand hit.

At the third experiment, the equation is x(t) = 9,834 t + 0,091.

What is this ?:

We can see that is a smash.

The first and the second experiment are closely same result because it's 2.85 t.

The third experiment is the only one who is different because it's faster (9.834 t),that's why we can see directly a smash one.

4. REFLECTION

Conclusion:

Comparison of the results of the different countries:Each experiment is different

Reflection:

5. REFERENCES