Dynamika chodzenia

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będzie o tym:

→ nieco teorii

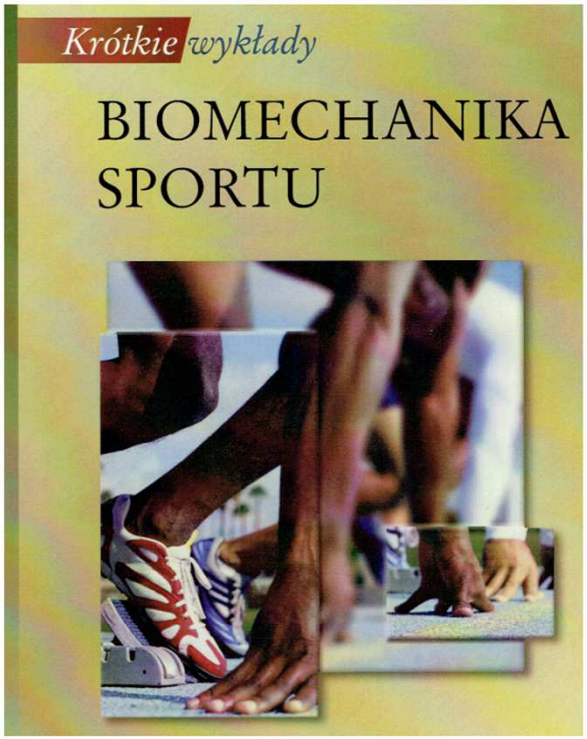
→ opis metody badawczej

→ wyniki:

- program Tracker
- aplikacja Phyphox

→ wnioski

źródła



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Compliant leg behaviour explains basic dynamics of walking and running

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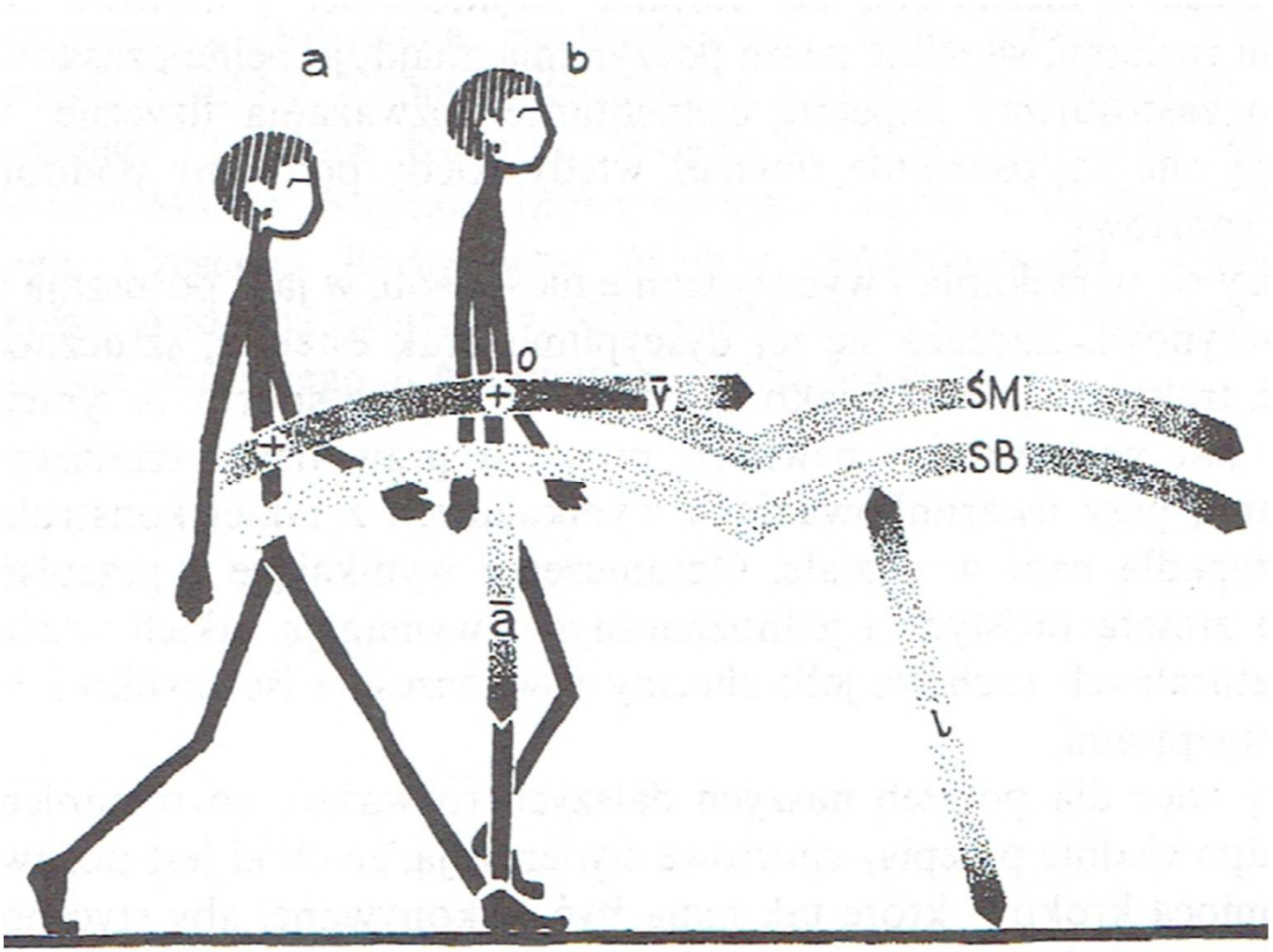
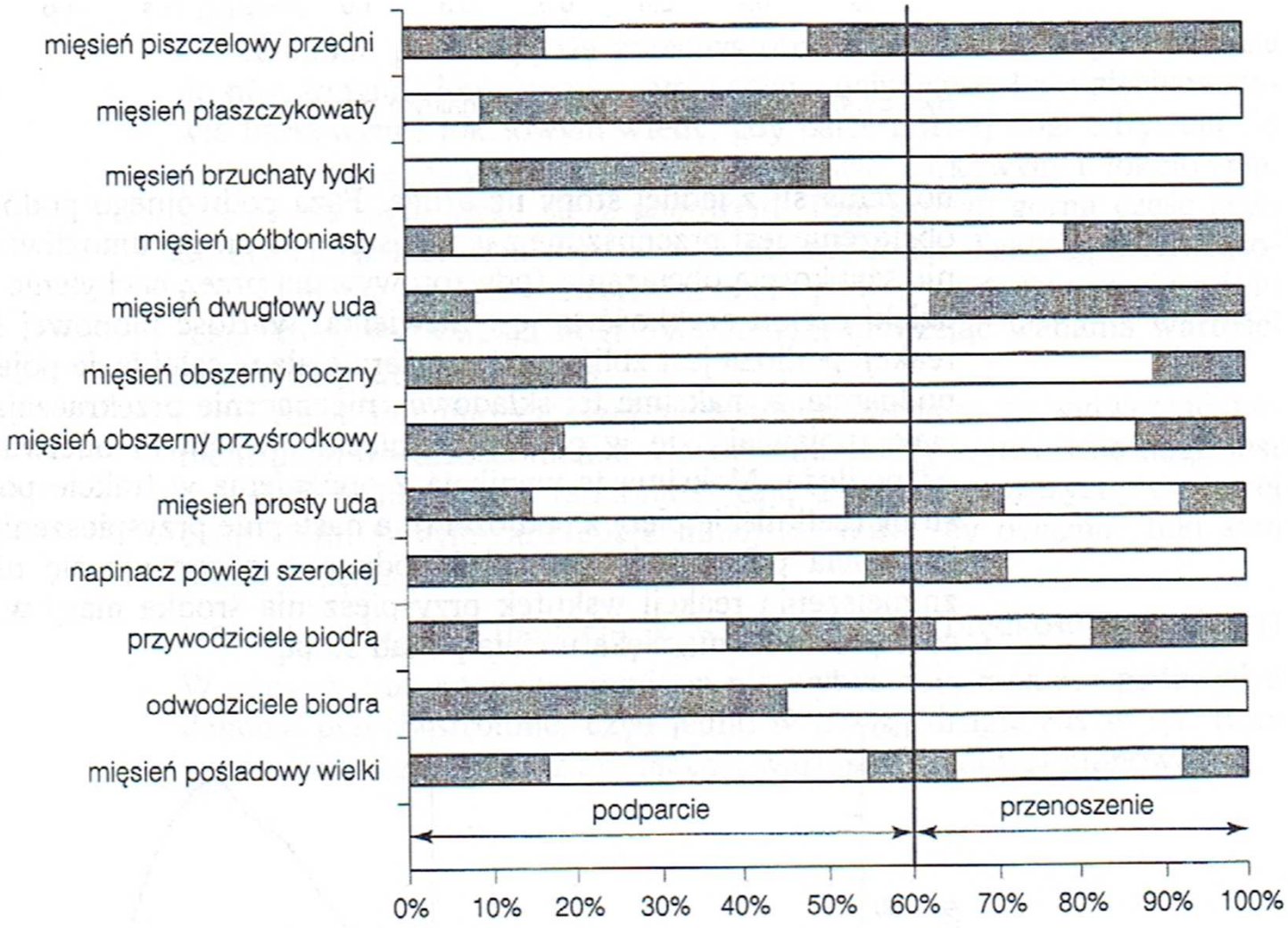
The basic mechanics of human locomotion are associated with vaulting over stiff legs in walking and rebounding on compliant legs in running. However, while rebounding legs well explain the stance dynamics of running, stiff legs cannot reproduce that of walking. With a simple bipedal spring–mass model, we show that not stiff but compliant legs are essential to obtain the basic walking mechanics; incorporating the double support as an essential part of the walking motion, the model reproduces the characteristic stance dynamics that result in the observed small vertical oscillation of the body and the observed out-of-phase changes in forward kinetic and gravitational potential energies. Exploring the parameter space of this model, we further show that it not only combines the basic dynamics of walking and running in one mechanical system, but also reveals these gaits to be just two out of the many solutions to legged locomotion offered by compliant leg behaviour and accessed by energy or speed.

Keywords: biomechanics; human gait; spring–mass model

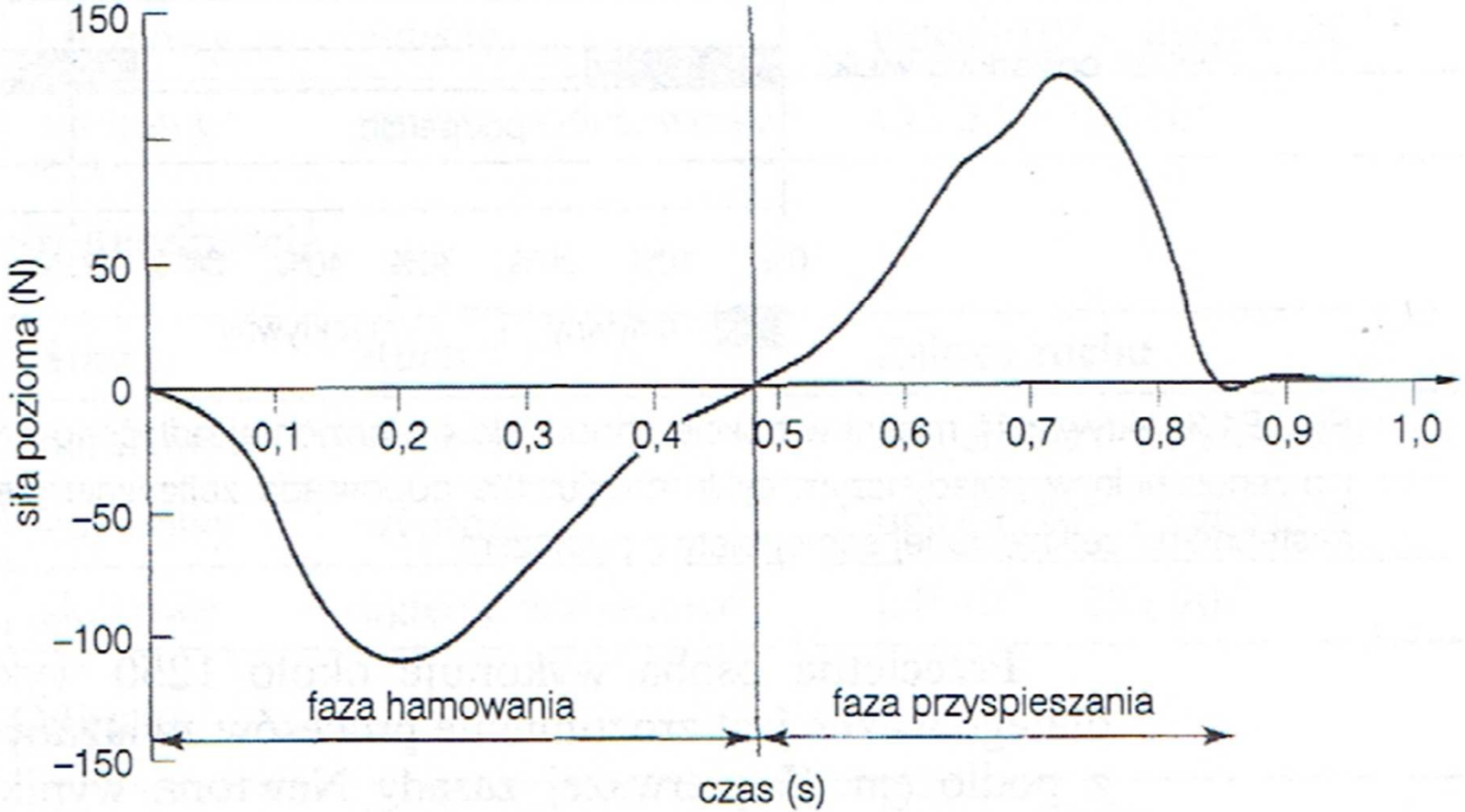
Chód sportowy – Fizyka sportu



mięśnie aktywne podczas chodzenia – Biomechanika sportu

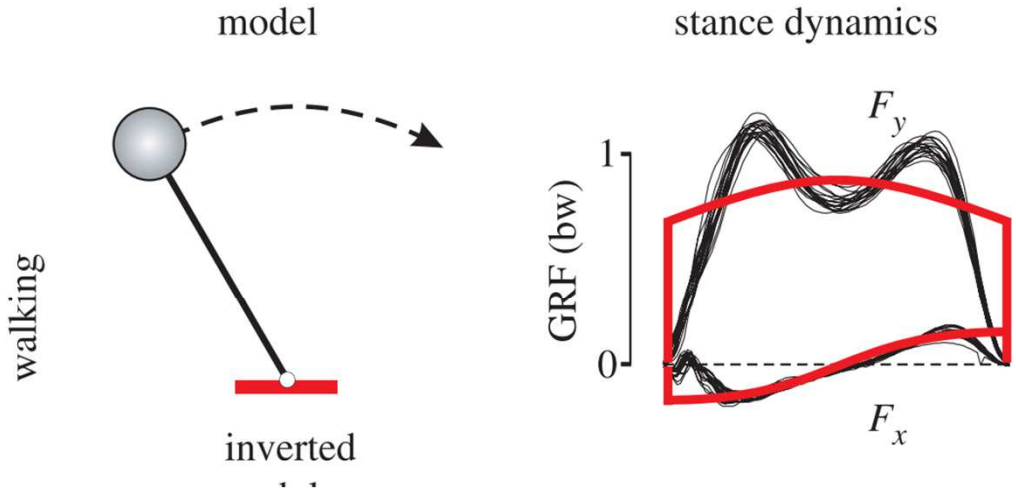


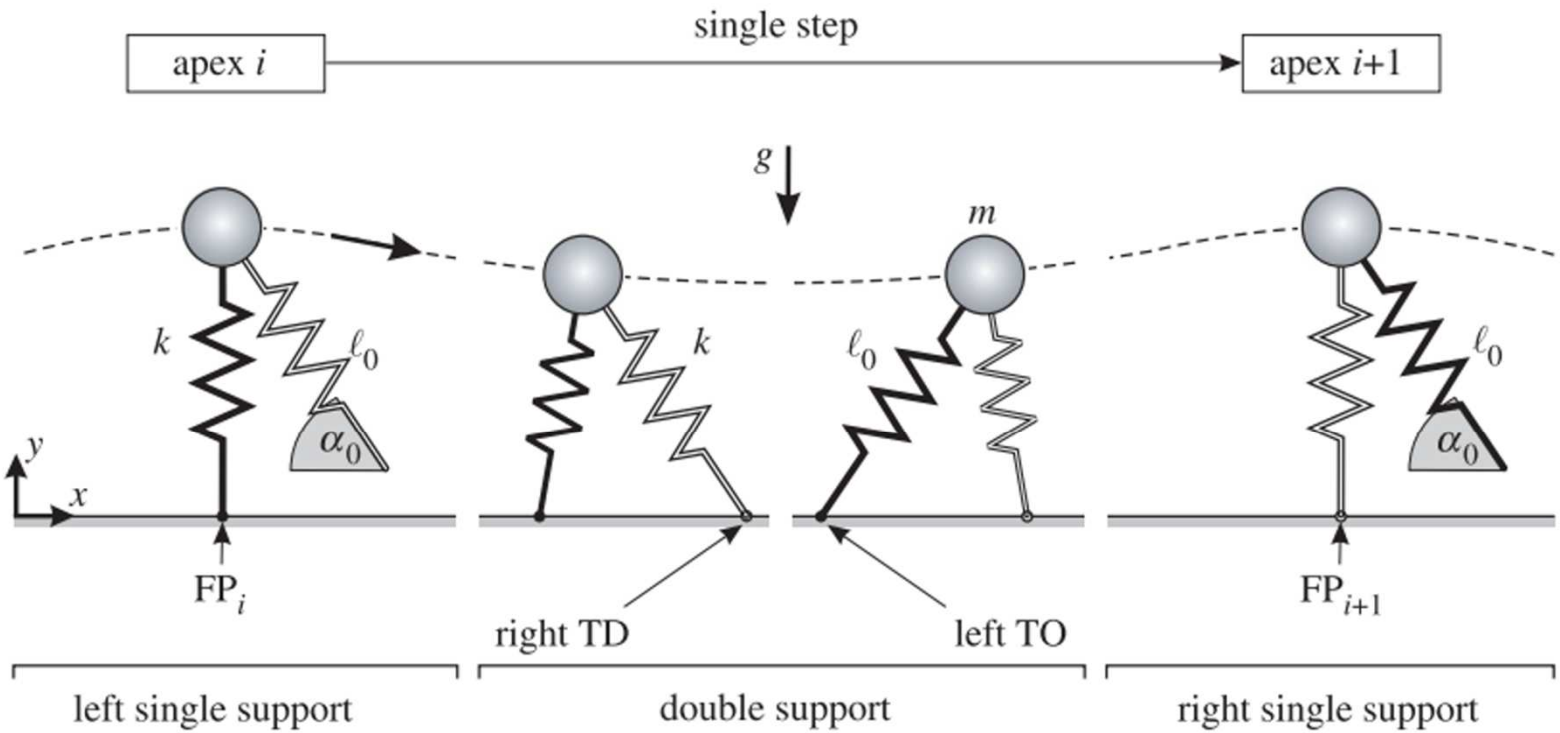
Siły działające na nogę – Biomechanika sportu



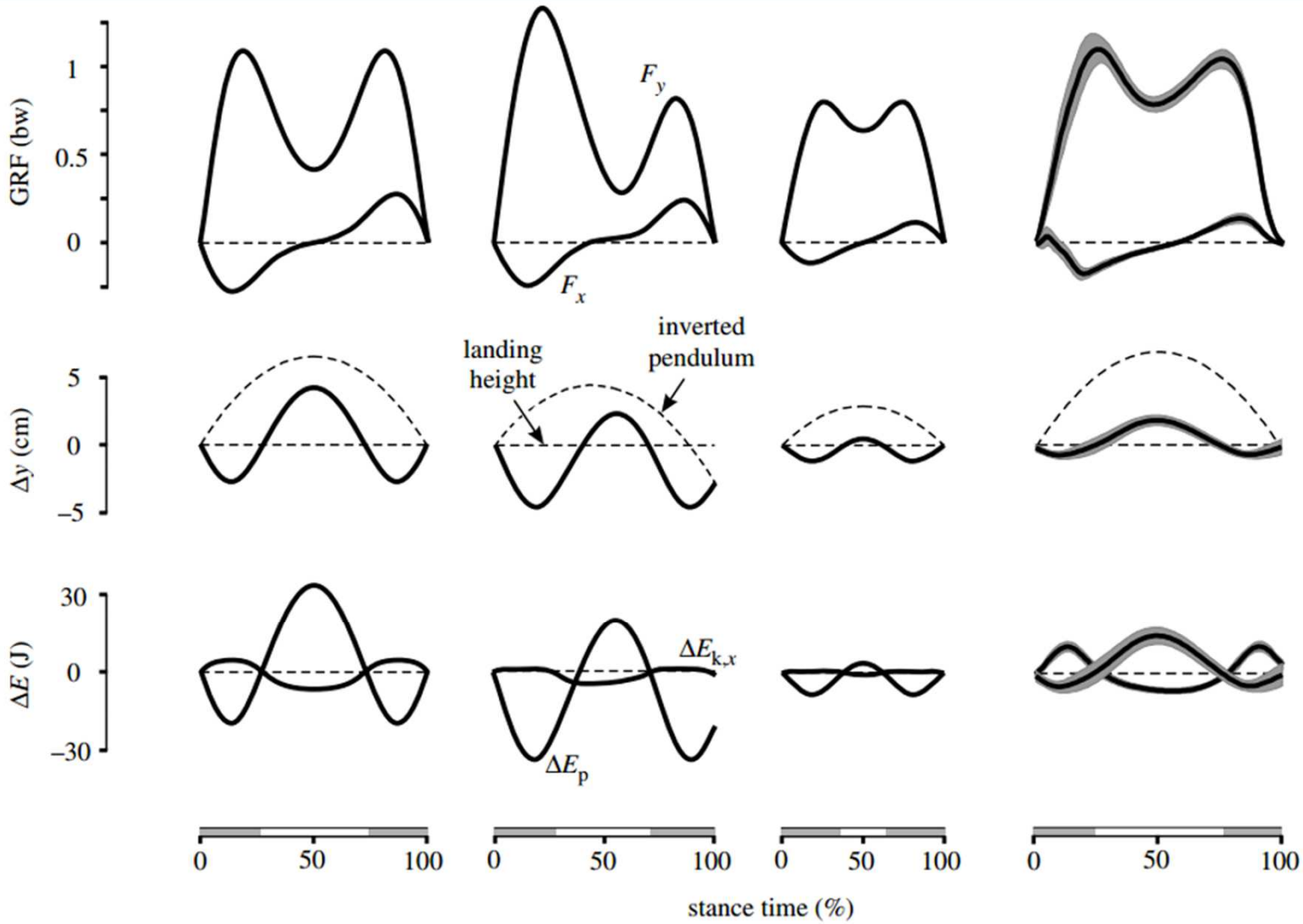
Rys. E1.5. Typowe siły w płaszczyźnie strzałkowej w normalnym chodzie

Modele chodu – Compliant leg behaviour …

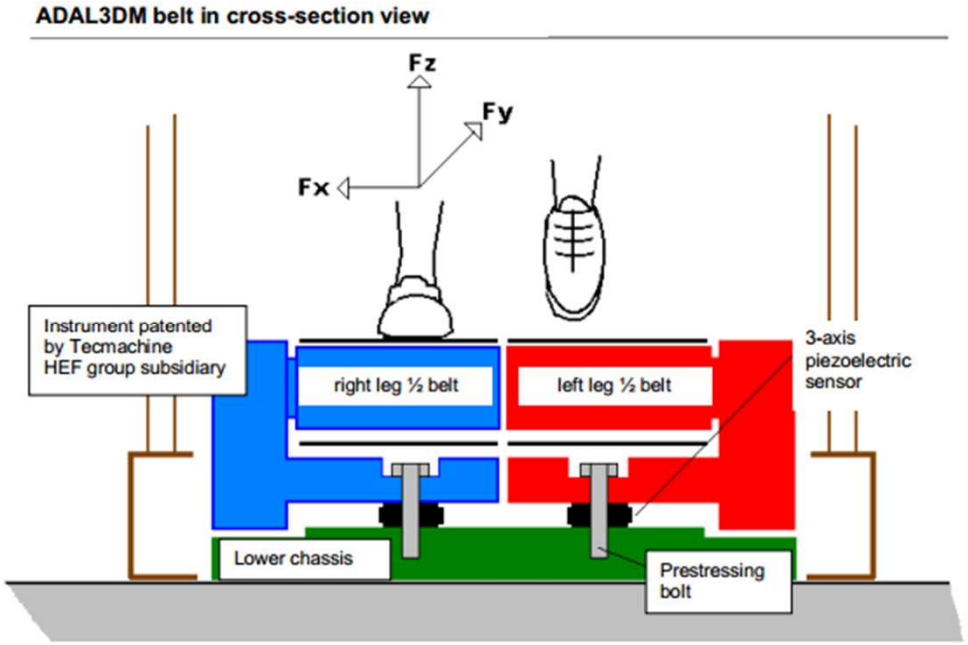


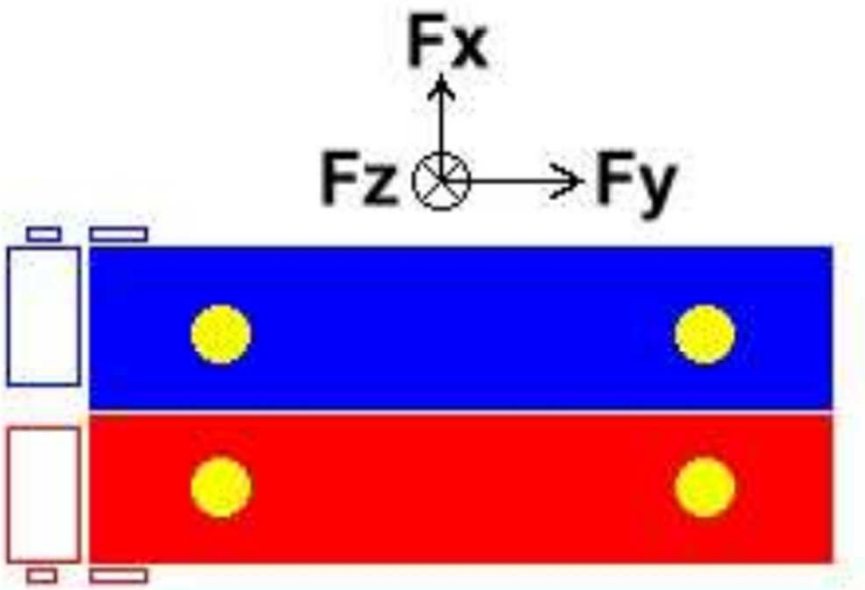


Siły działające podczas chodu – Compliant leg behaviour …



Sprzęt do badania sił – Compliant leg behaviour …

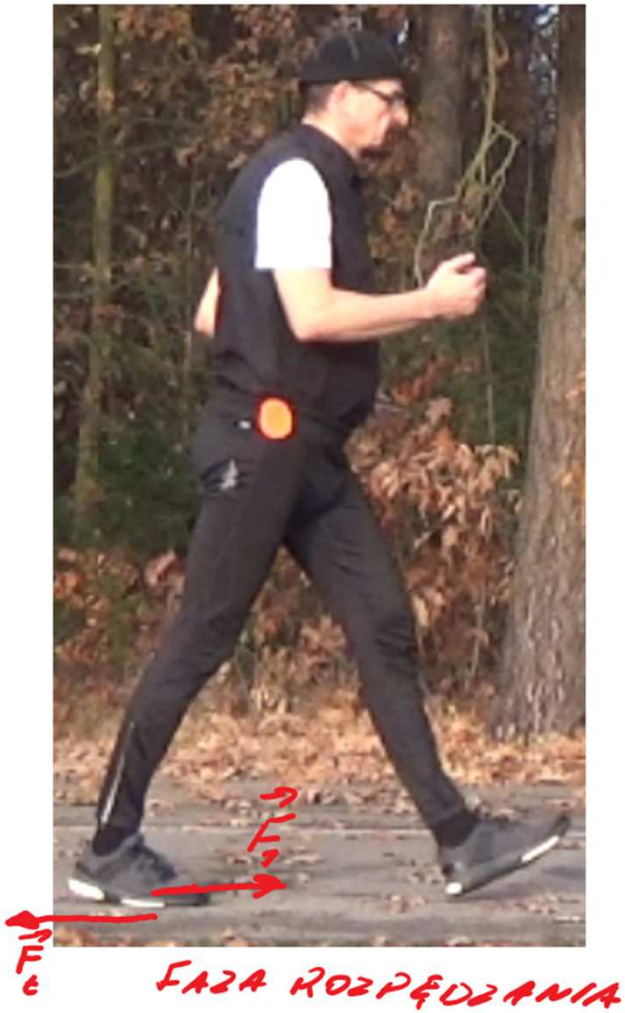


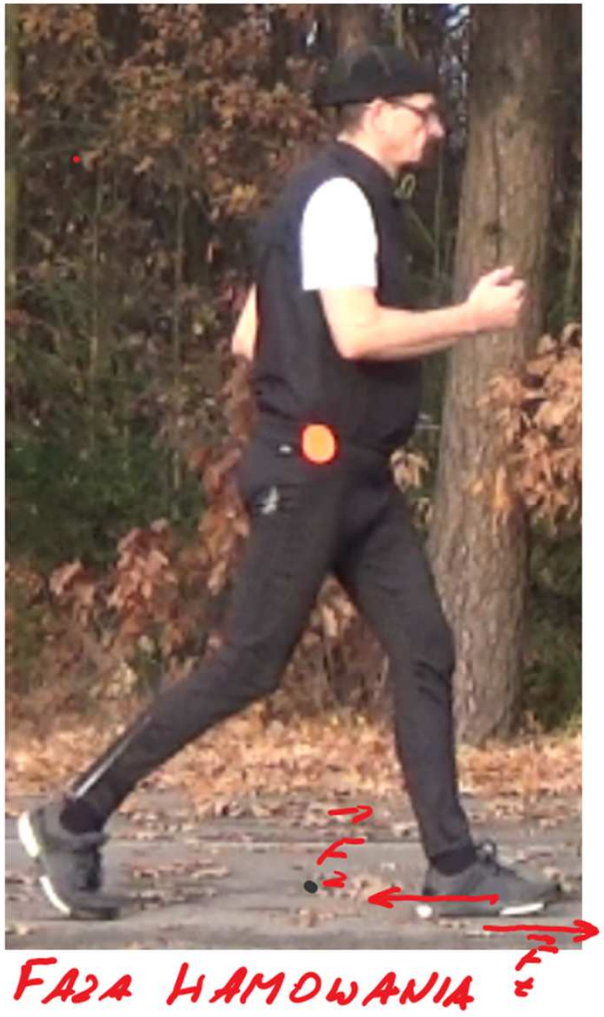


Klatki z filmu podczas badanego chodu

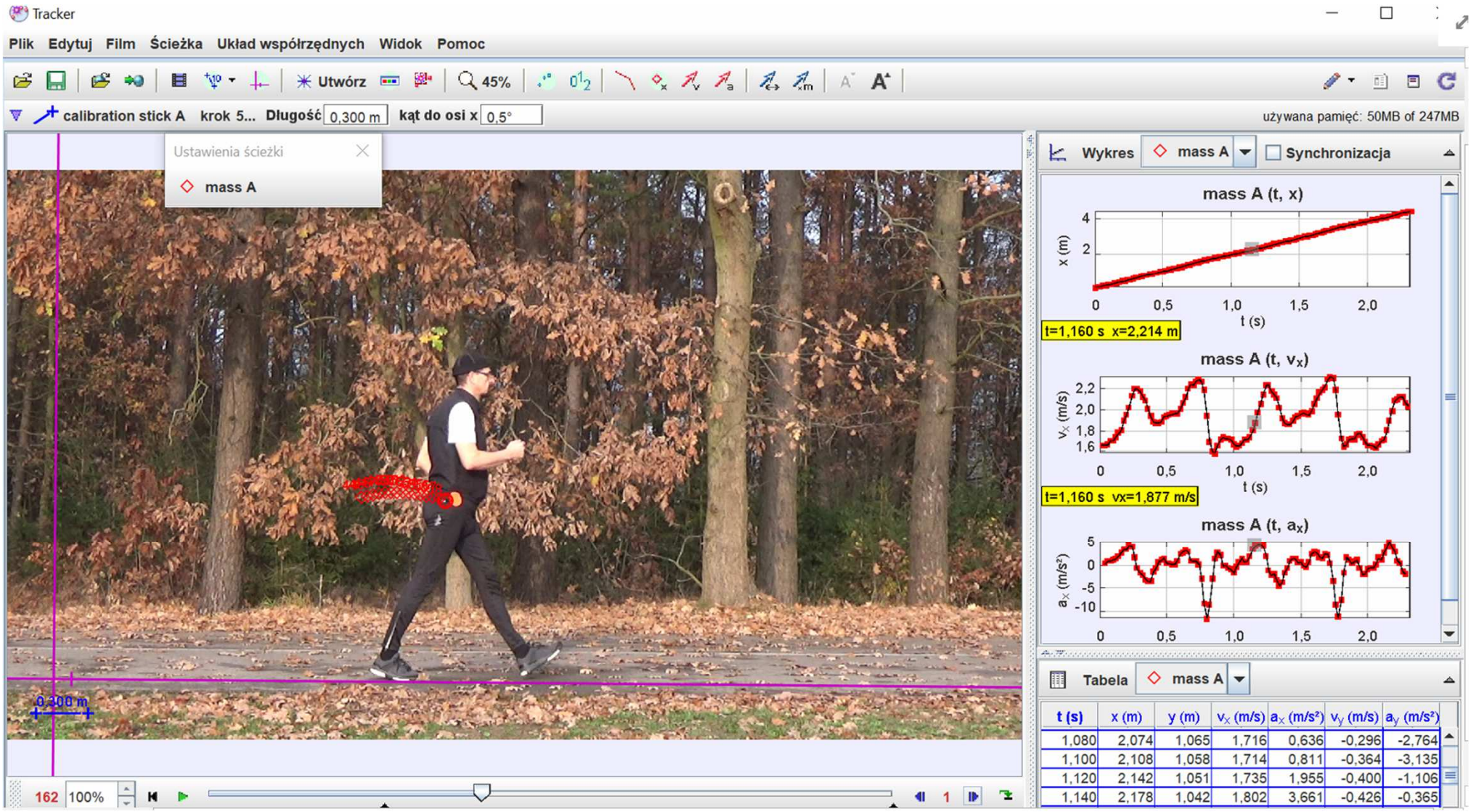
Podczas chodzenia zawsze utrzymany jest kontakt stopy z podłożem (co najmniej jednej).

Rozpędzani i hamowanie





Analiza ruchu – program Tracker



t (s)	x (m)	y (m)	v_x (m/s)	a_x (m/s²)	v_y (m/s)	a_y (m/s²)
1,080	2,074	1,065	1,716	0,636	-0,296	-2,764
1,100	2,108	1,058	1,714	0,811	-0,364	-3,135
1,120	2,142	1,051	1,735	1,955	-0,400	-1,106
1,140	2,178	1,042	1,802	3,661	-0,426	-0,365

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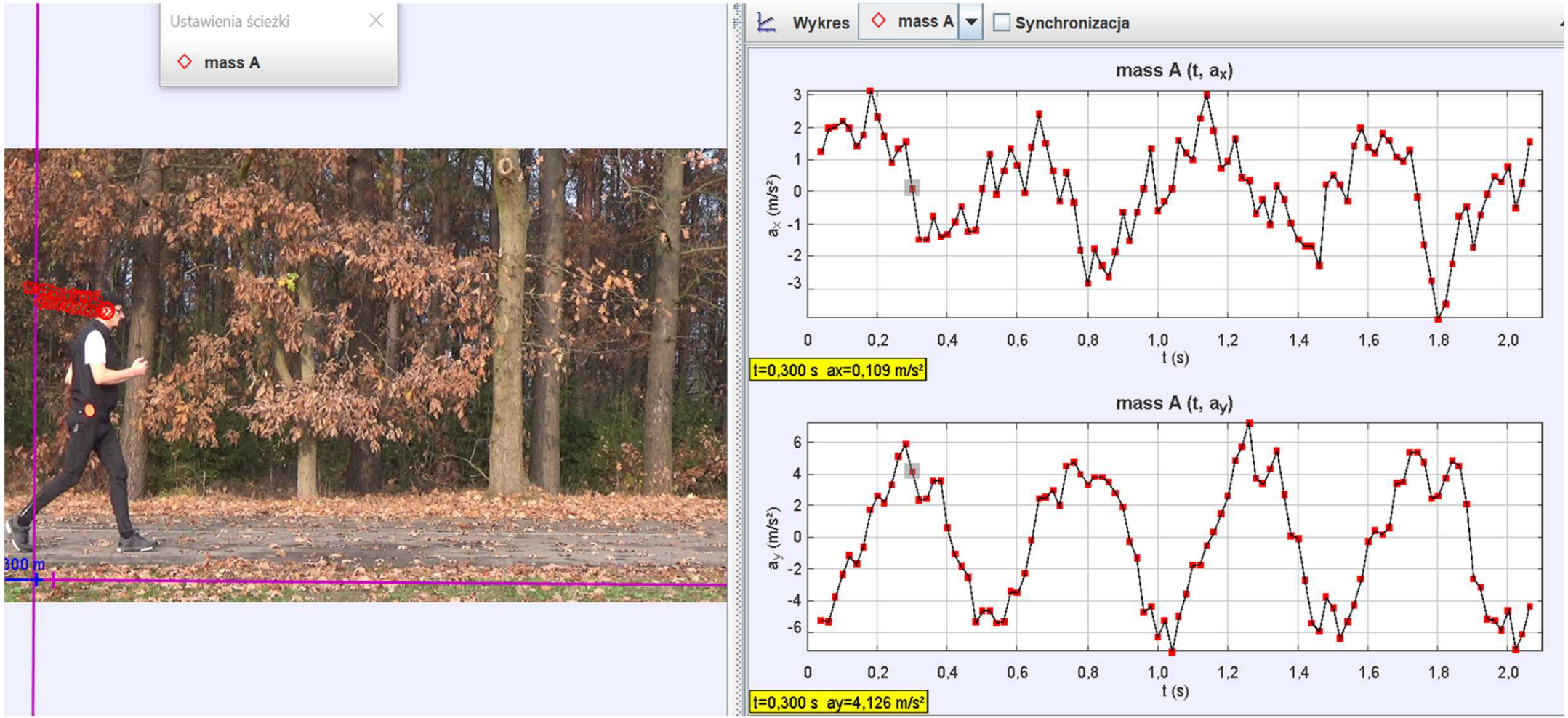
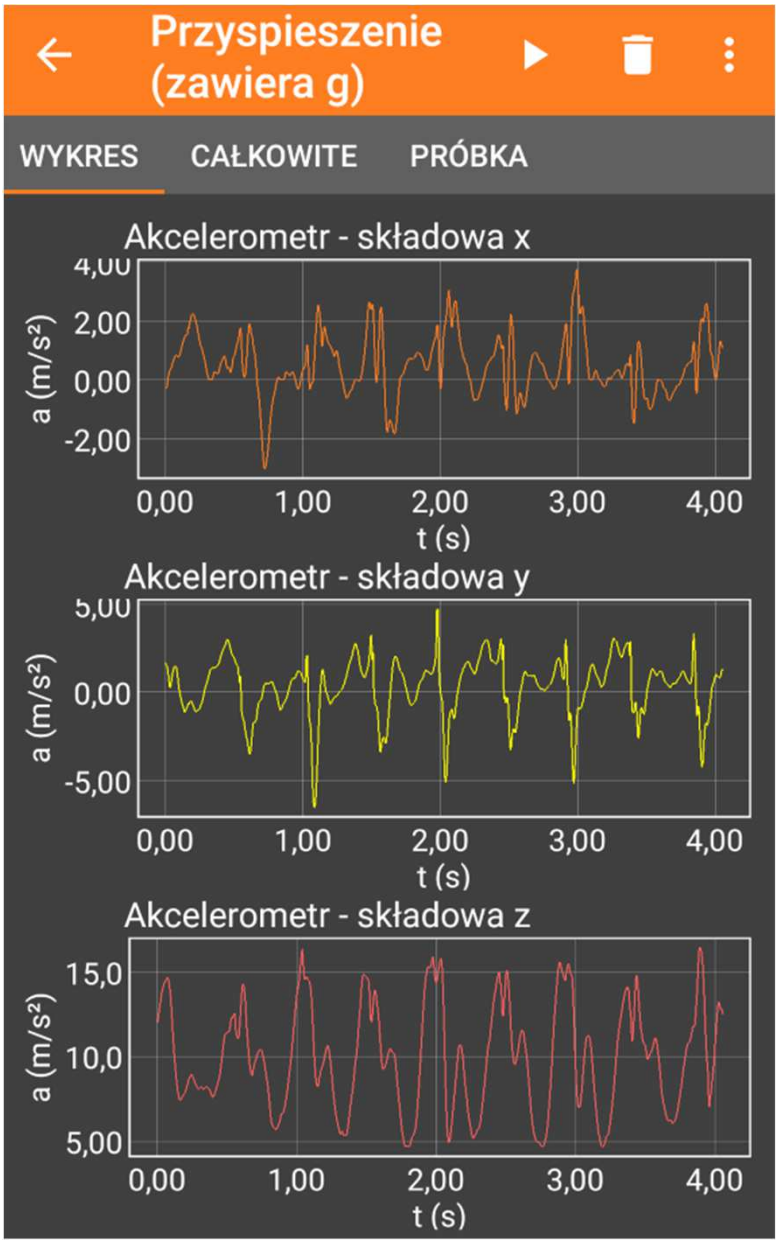


Analiza ruchu – aplikacja Phyphox



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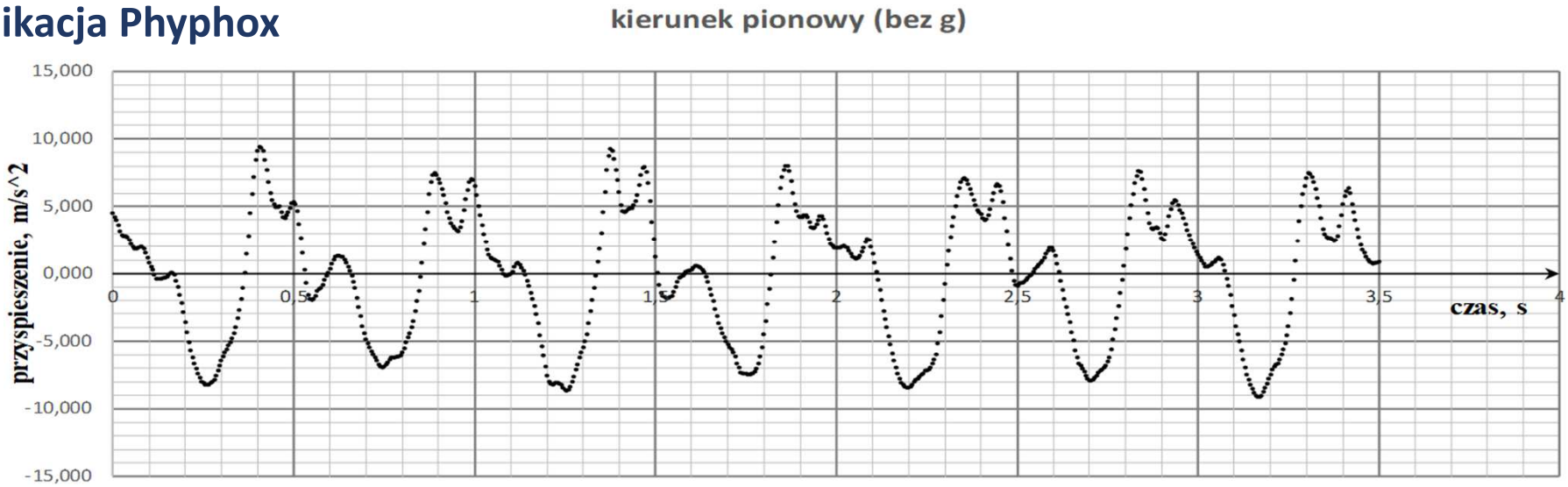

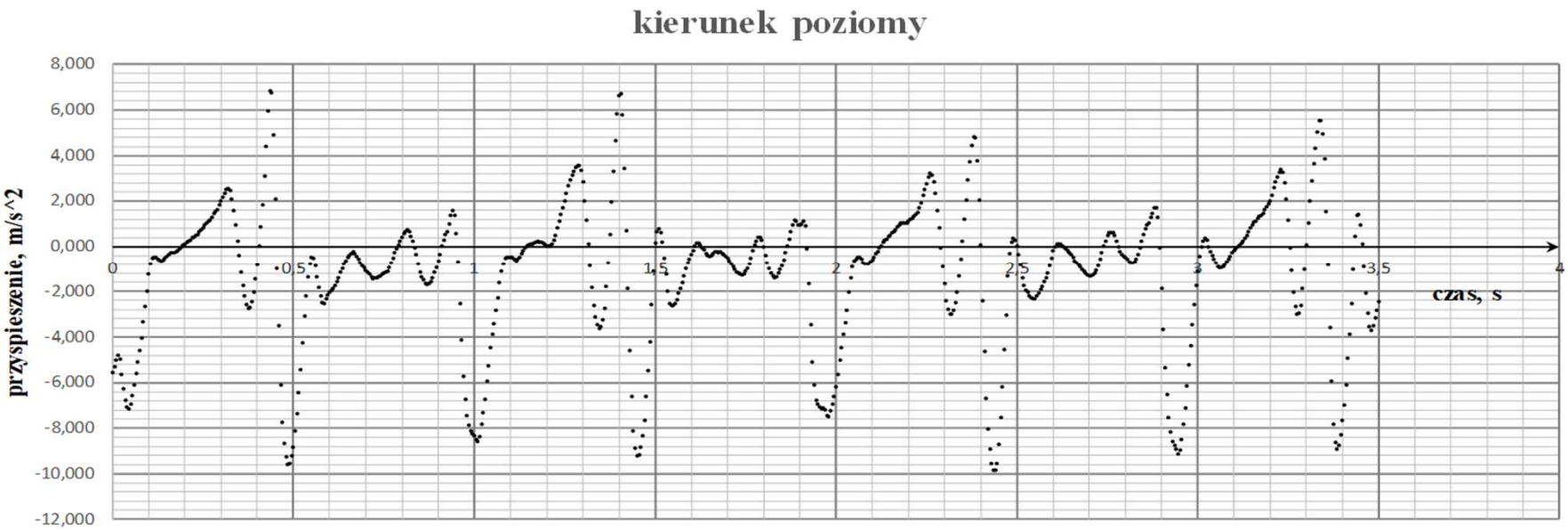

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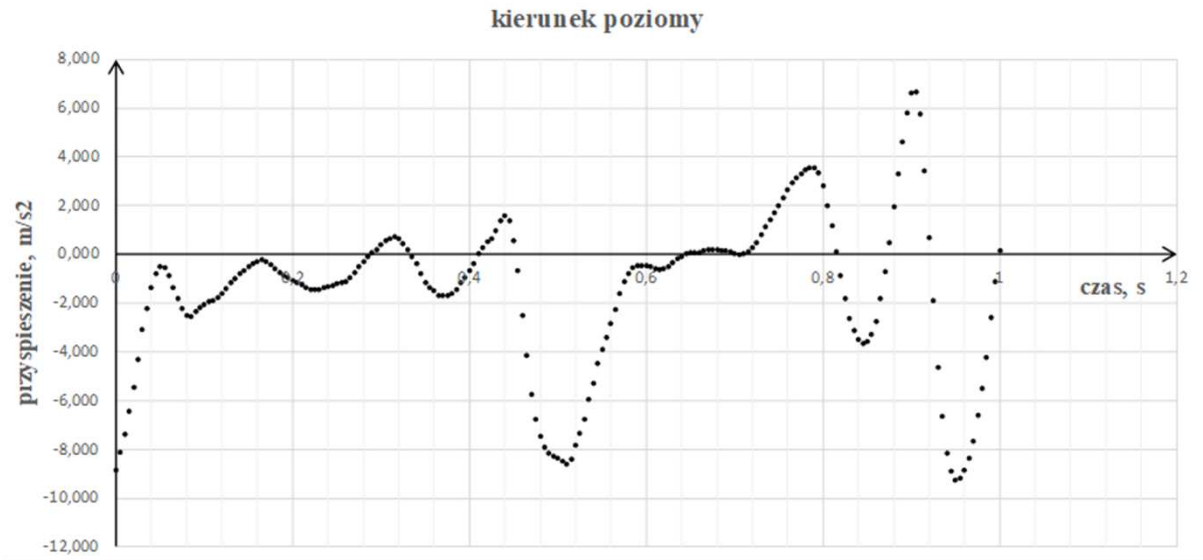
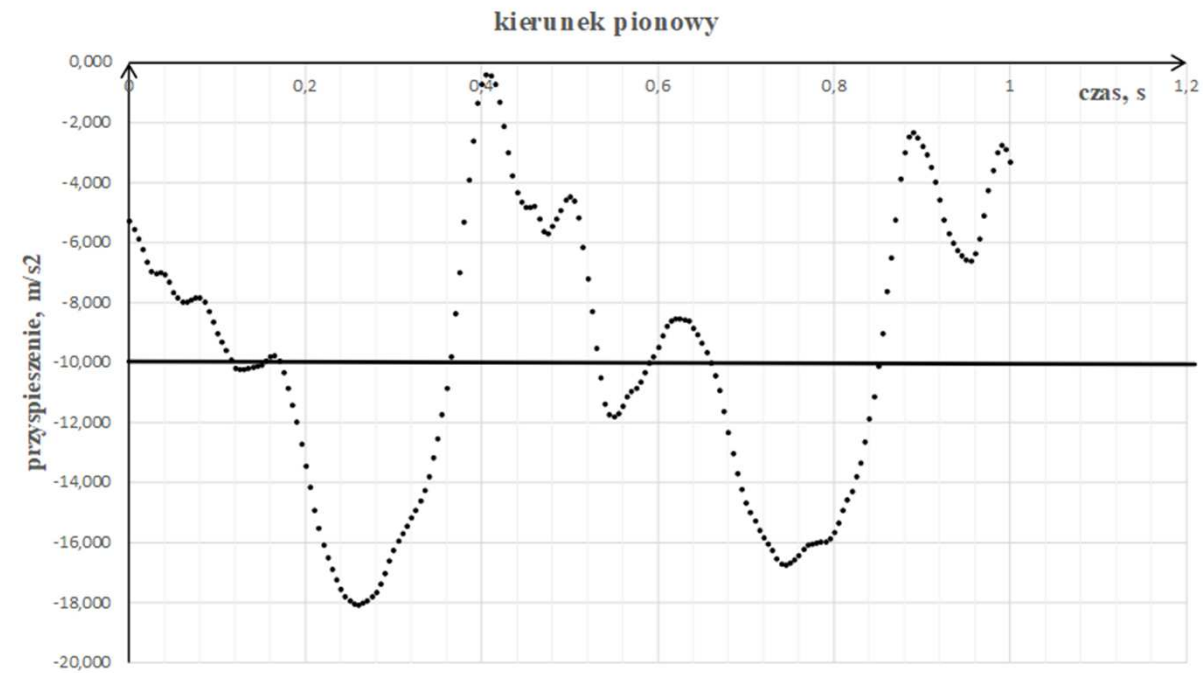
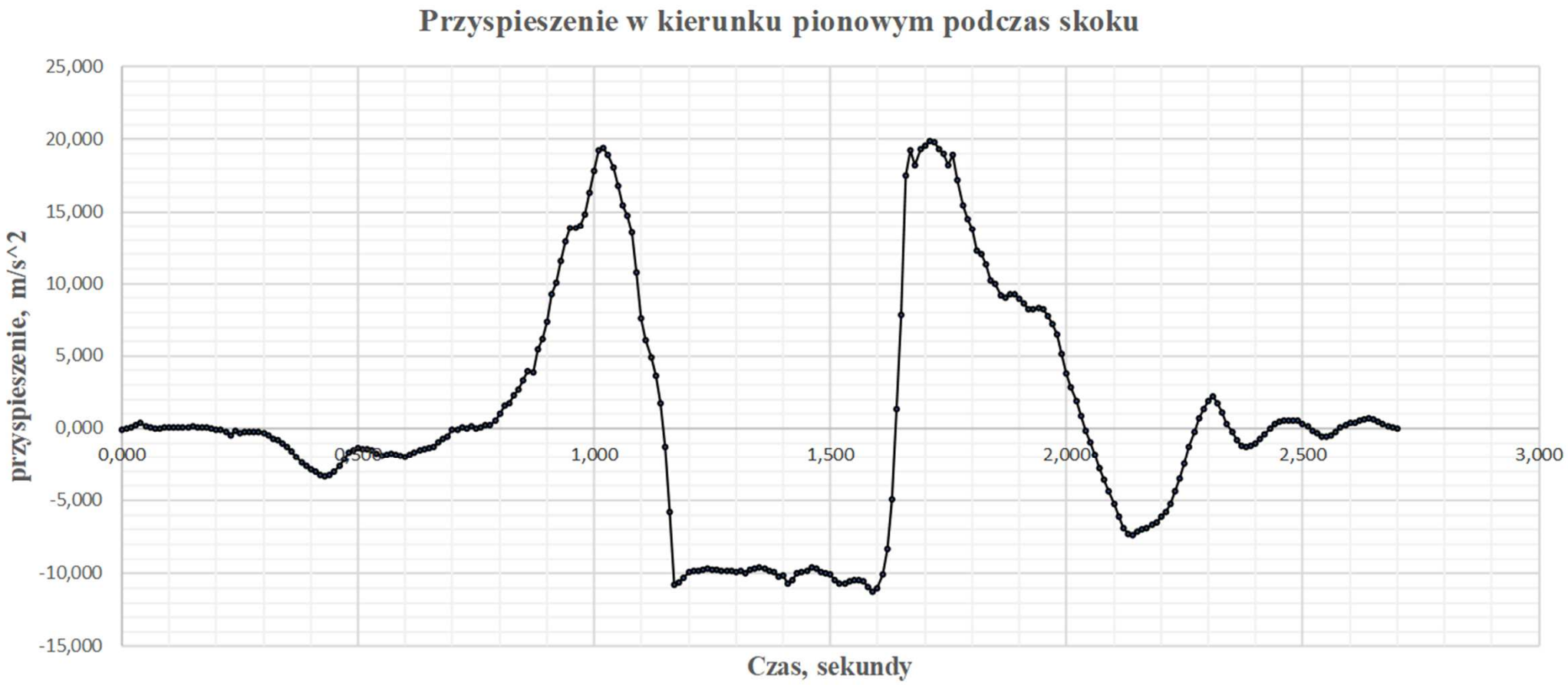




Inny przykład wykorzystania aplikacji Phyphox



Podsumowanie

- KAŻDY MOŻE PROWADZIĆ TAKĄ ANALIZĘ
- KAMERA POWINNA BYĆ USTAWIONA PROSTOPADLE DO KIERUNKU RUCHU
  - OGNISKOWA OBIEKTYWU KAMERY JAK NAJDŁUŻSZA
  - CZAS NAŚWIETLANIA POJEDYNCZEJ KLATKI POWINIEN BYĆ JAK NAJKRÓTSZY
- MOŻNA ZBADAĆ WPŁYW OBUWIA (PODŁOŻA) NA SIŁĘ NACISKU.