

The background is a deep blue gradient with a subtle pattern of white dots. Overlaid on the left side are several concentric circles and arcs in a lighter blue color. Some of these arcs have degree markings, such as 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, and 260. There are also small white arrows pointing in various directions, suggesting a sense of rotation or movement.

SPLIT

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HISTORIA SPLOTU

- Jedno z pierwszych wystąpień splotu całkowego można znaleźć w pracy D'Alemberta z 1754r.
- Splot pojawiał się na przestrzeni lat naturalnie przy rozwiązywaniu problemów matematycznych czy fizycznych

ZASTOSOWANIA SPLOTU

- Filtrowanie sygnałów
- Przetwarzanie obrazów
- Nakładanie pogłosu na sygnał dźwiękowy
- Sejsmologia
- Tomografia komputerowa



DEFINICJA SPLOTU

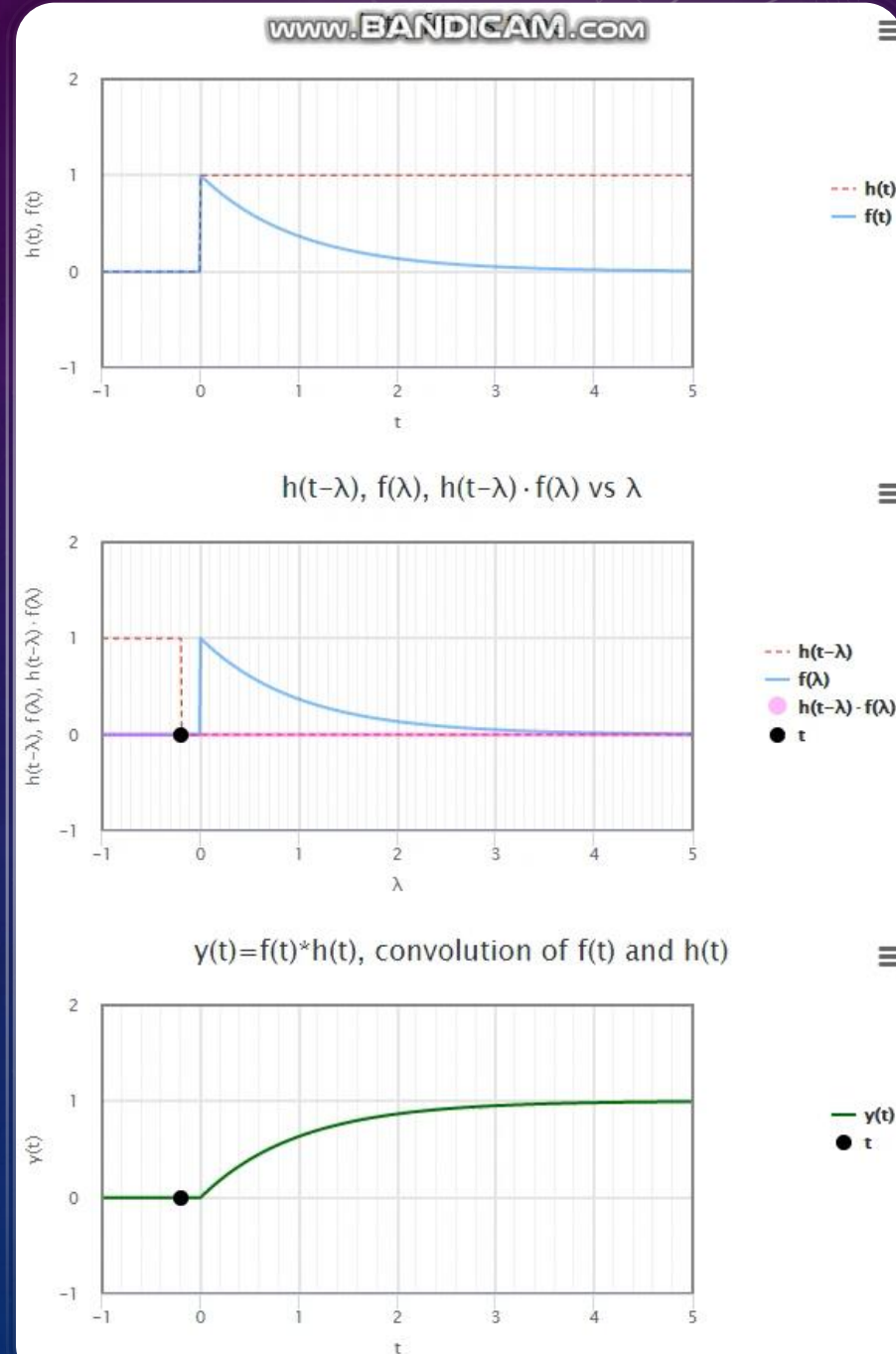
$$(f * g)(t) = \int_0^t f(\tau)g(t - \tau)d\tau$$

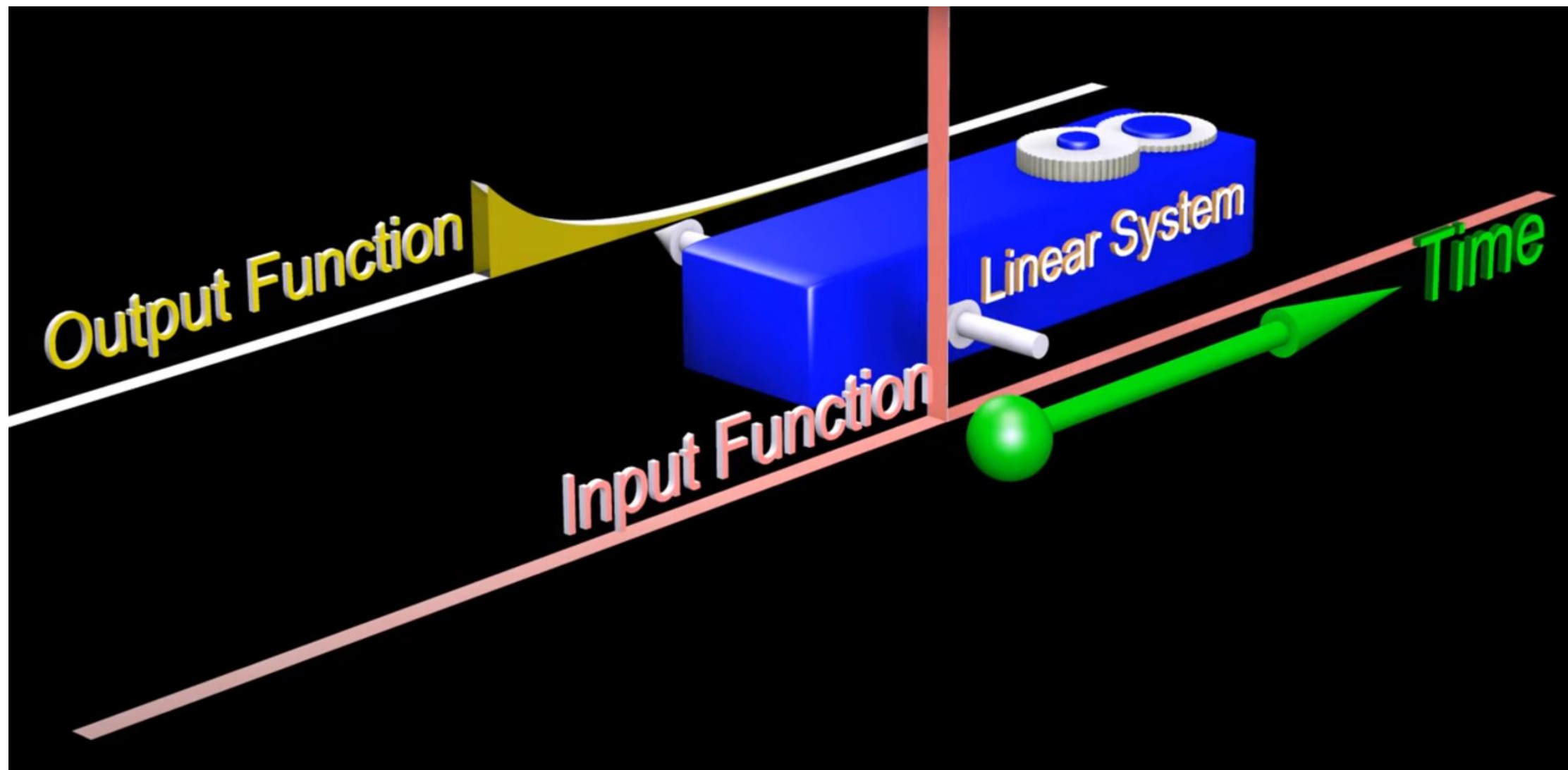
WIZUALIZACJA „MATEMATYCZNA”

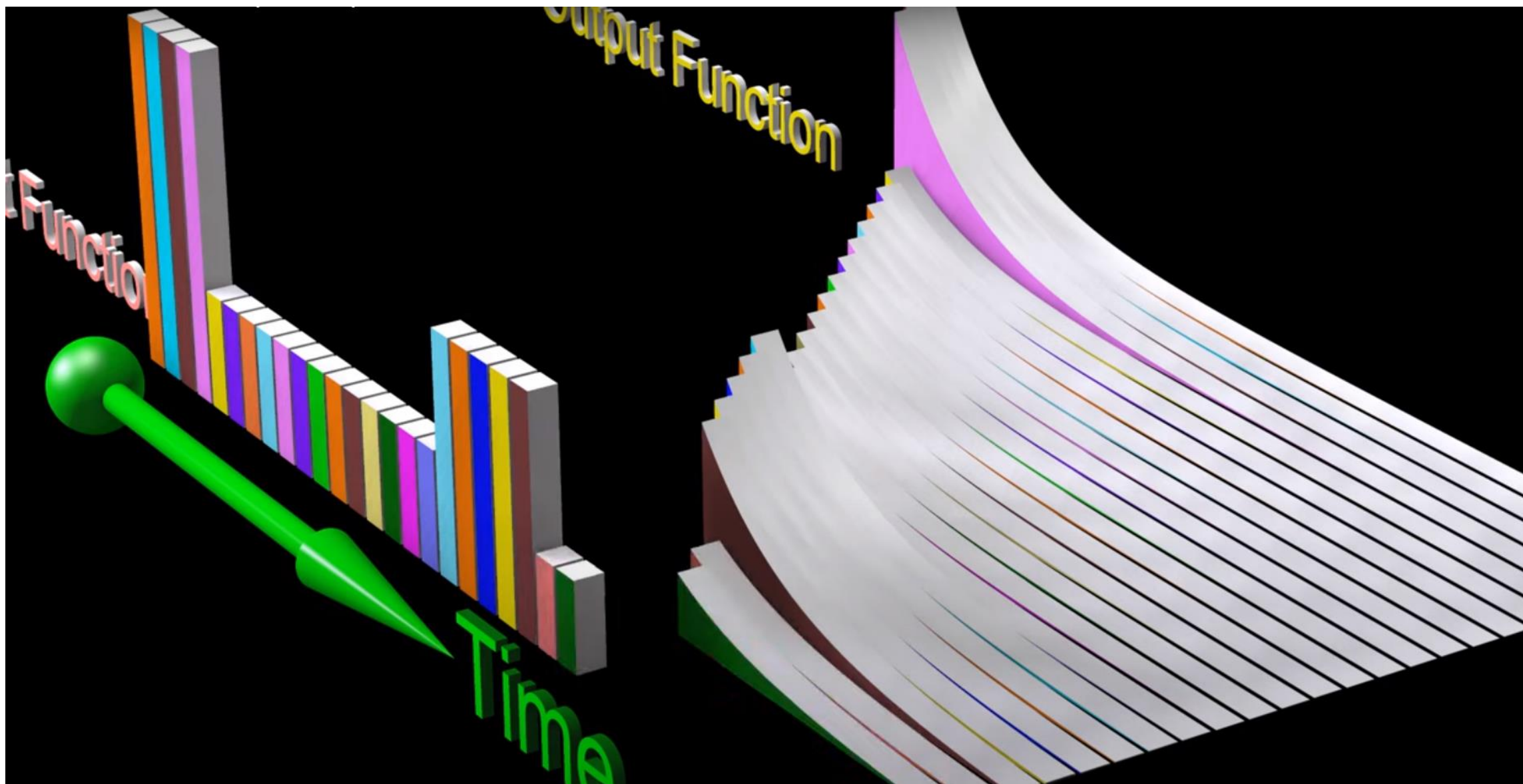
$$(f * g)(t) = \int_{-\infty}^{+\infty} f(\tau)g(t - \tau)d\tau$$

$$f_1(t) = e^{-t}, g_1(t) = \theta(t)$$

$$f_1 = e^{-t}, g_1 = \delta(t)$$

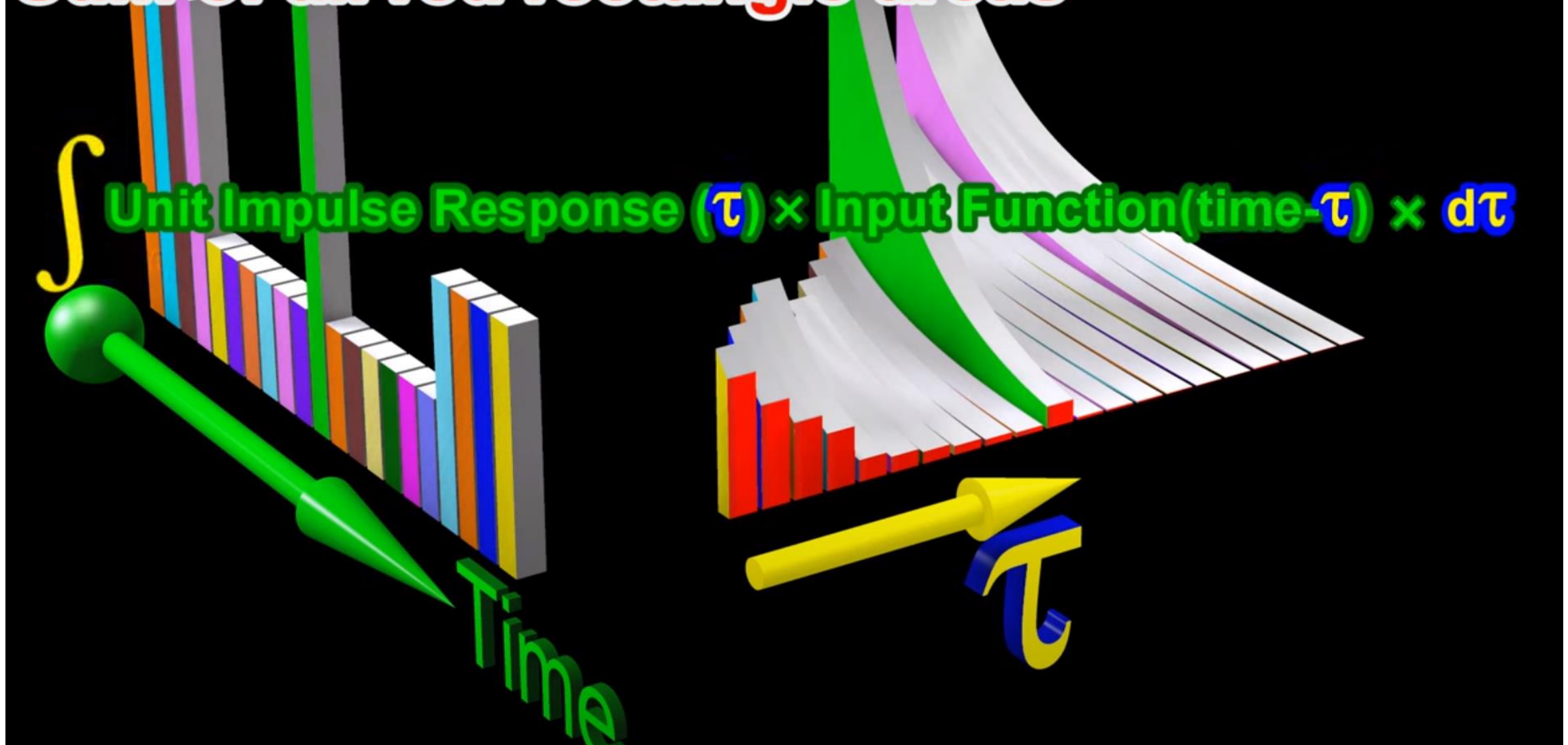






Sum of all red rectangle areas =

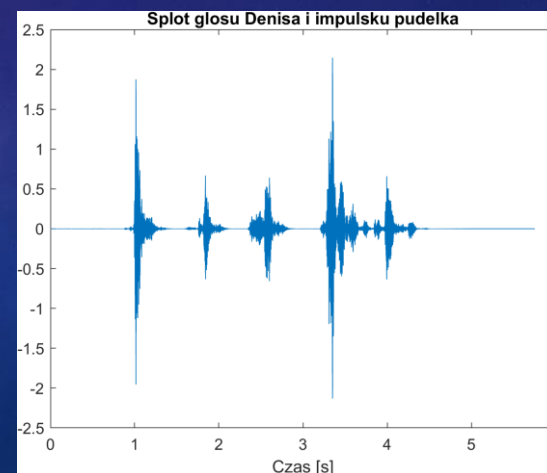
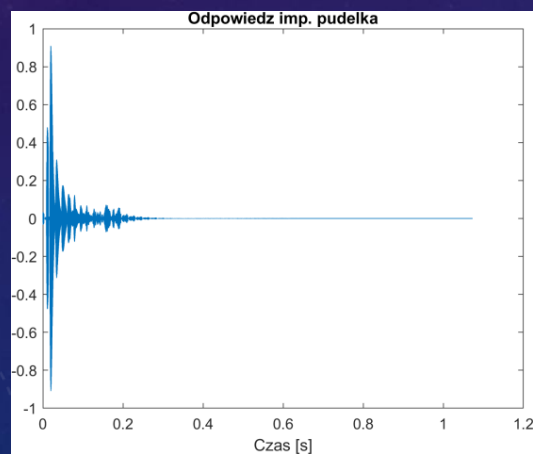
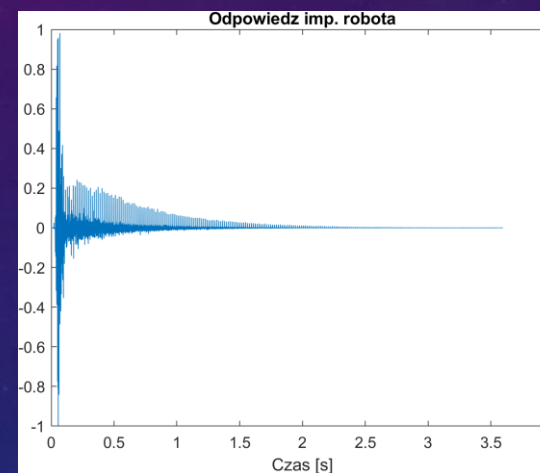
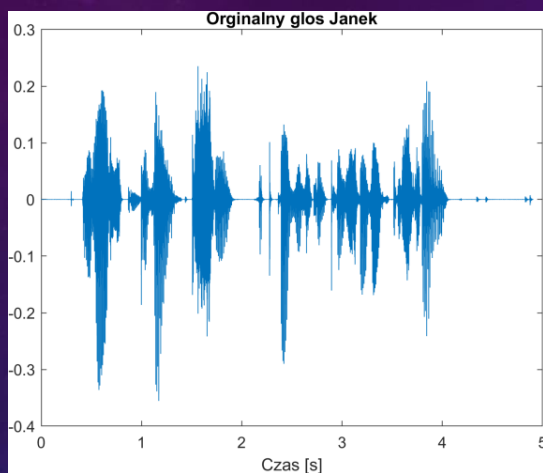
$$\int \text{Unit Impulse Response } (\tau) \times \text{Input Function}(\text{time}-\tau) \times d\tau$$

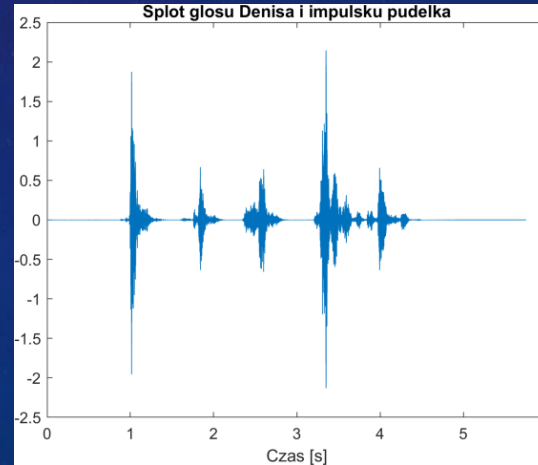
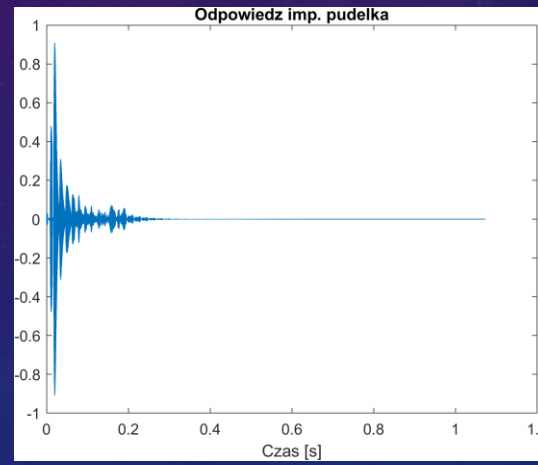
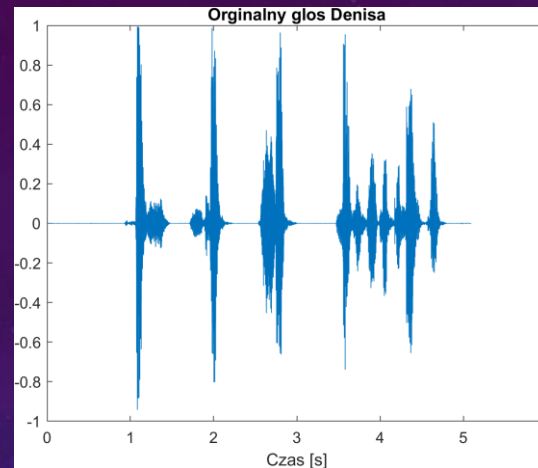
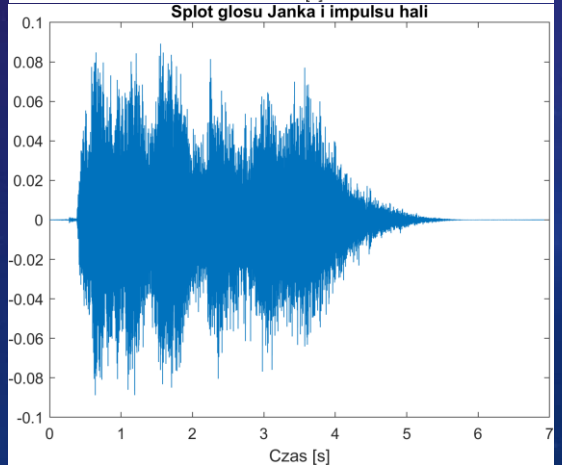
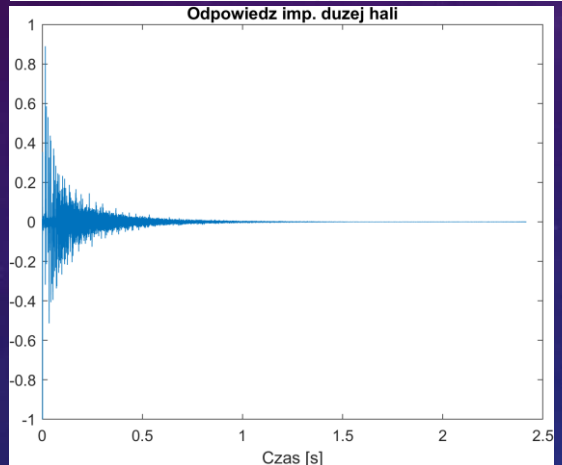
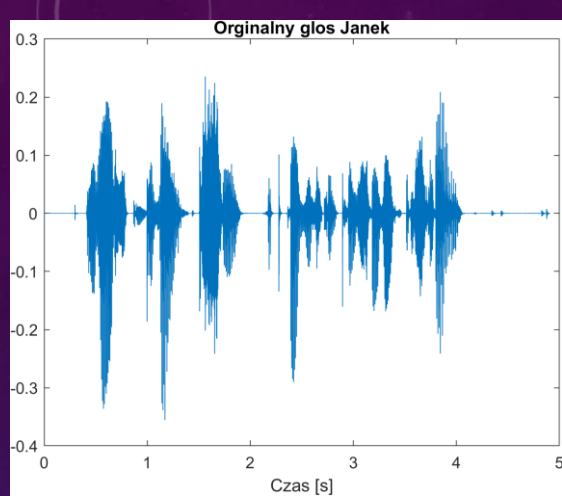
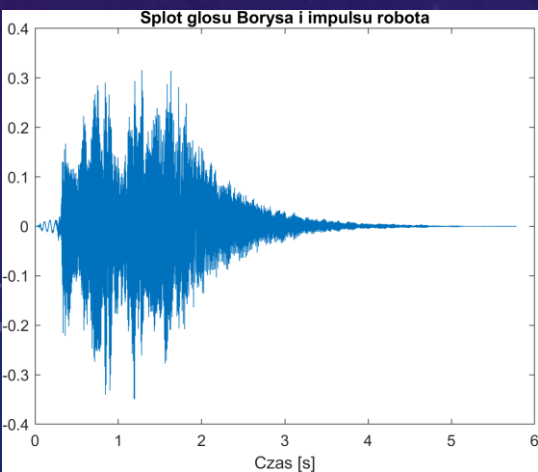
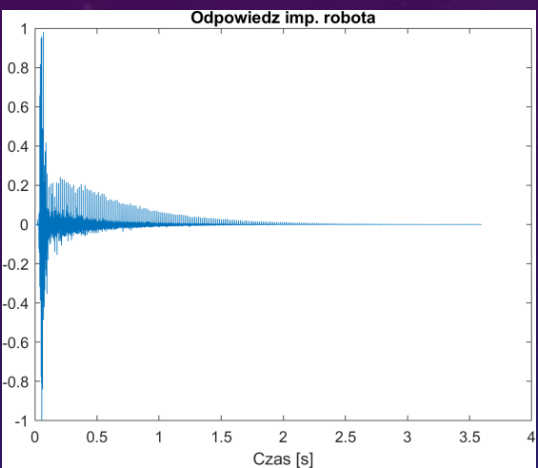
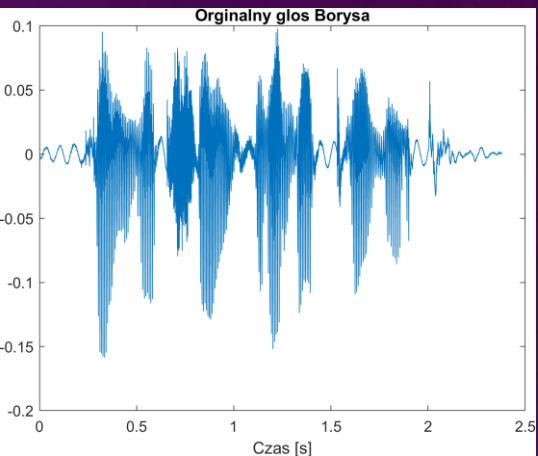


SPLOT W DZIEDZINIE T ORAZ S

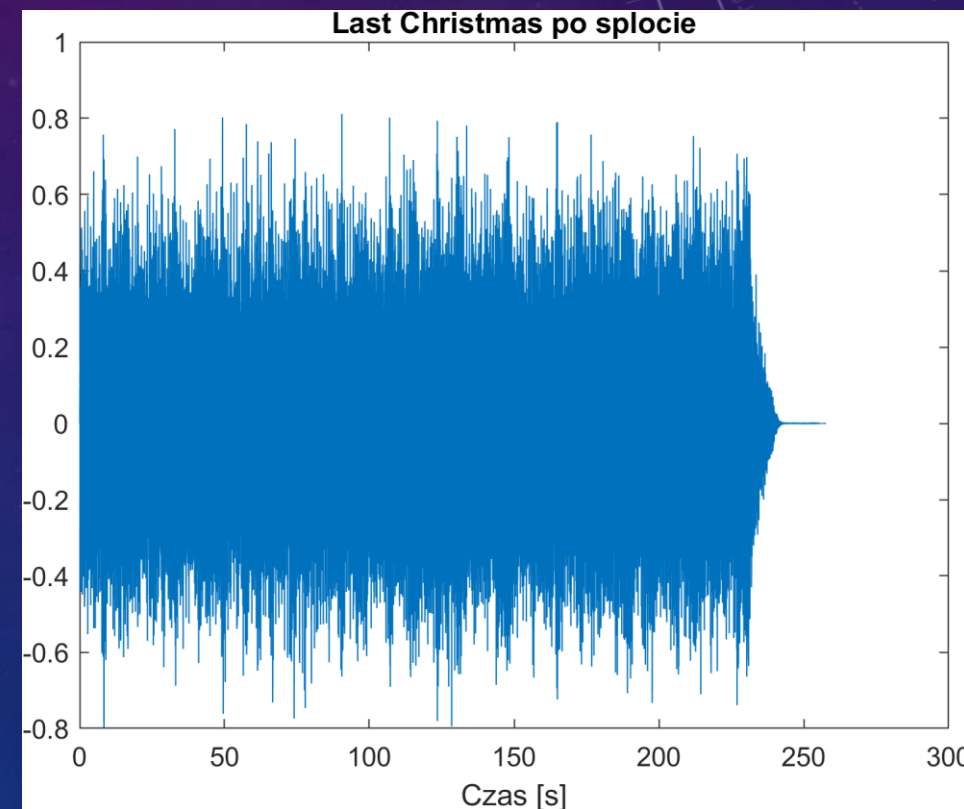
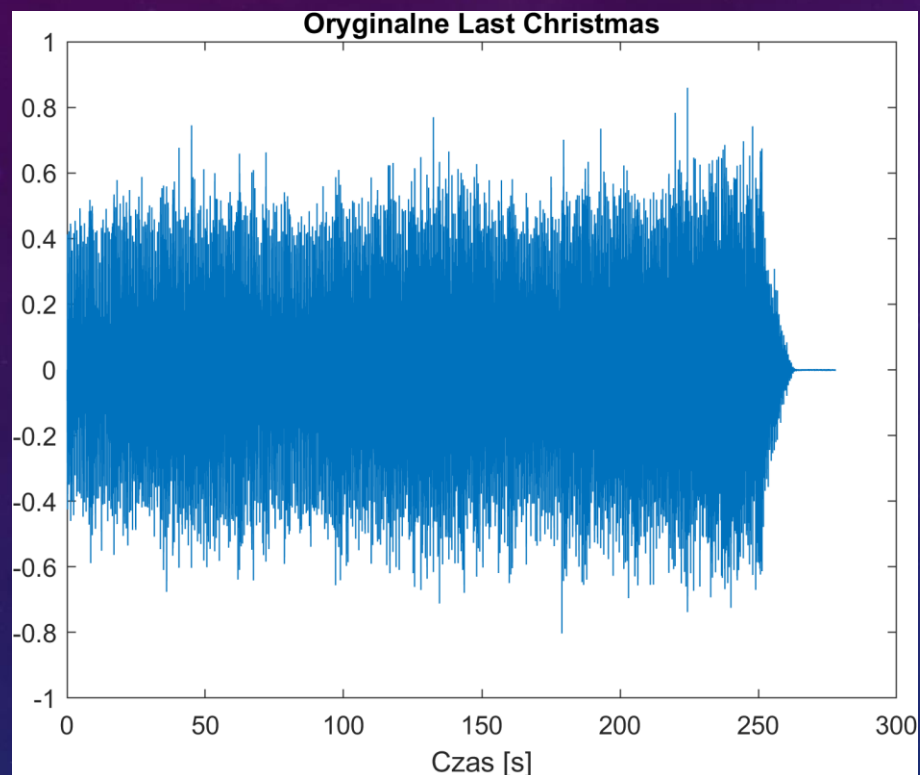
$$\begin{aligned} L(f * g) &= \int_0^{\infty} (f * g)(t) e^{-st} dt \\ &= \int_0^{\infty} \int_0^t f(\tau) g(t - \tau) e^{-st} d\tau dt, v = t - \tau \\ &= \int_0^{\infty} \int_0^{\infty} f(\tau) g(v) e^{-s(v+\tau)} dv d\tau \\ &= \int_0^{\infty} \int_0^{\infty} f(\tau) g(v) e^{-s(v+\tau)} dv d\tau = \int_0^{\infty} f(\tau) e^{-s\tau} d\tau \int_0^{\infty} g(v) e^{-sv} dv \\ &= F(s) \cdot G(s) \end{aligned}$$

PRZYKŁAD ZA POMOCĄ DZWIĘKU

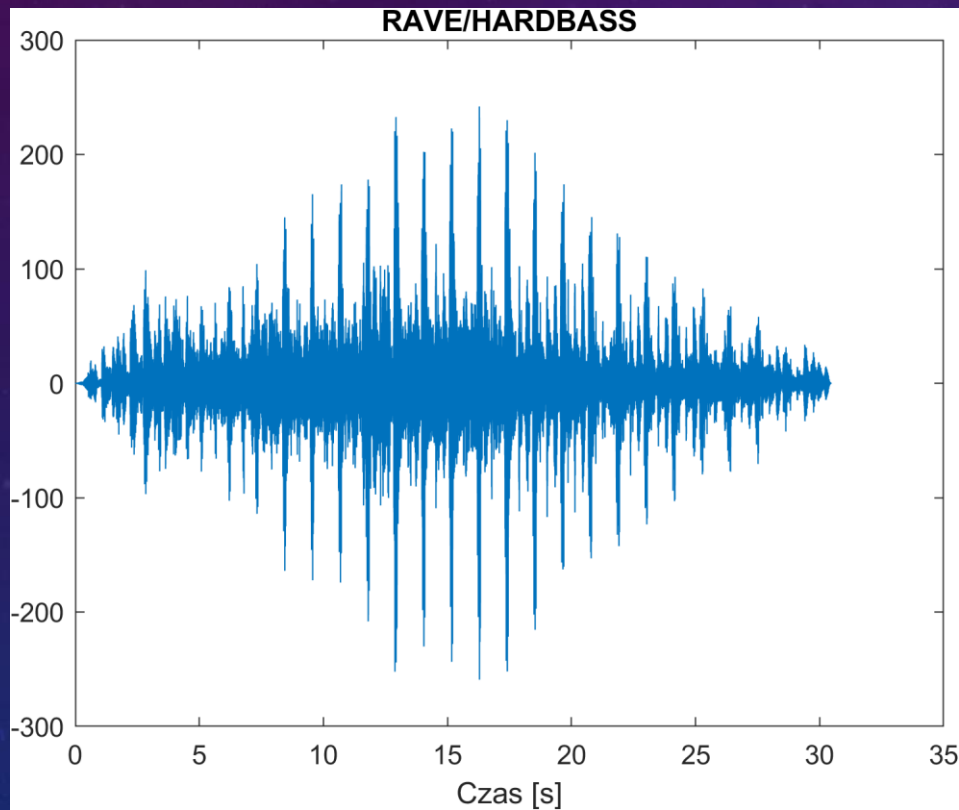




LAST CHRISTMAS Z ECHEM



LAST CHRISTMAS JAKO IMPULS, SPLOT Z LAST CHRISTMAS



ŹRÓDŁA

- Impulsy - http://www.cksde.com/p_6_250.htm
- <https://youtu.be/acAw5WGtzuk>
- https://ocw.mit.edu/courses/mathematics/18-03sc-differential-equations-fall-2011/unit-iii-fourier-series-and-laplace-transform/transfer-system-and-weight-functions-greens-formula/MIT18_03SCF11_s30_5text.pdf
- <https://youtu.be/E8gmARGvPII>
- <https://es.slideshare.net/Alexdfar/origin-adn-history-of-convolution>
- <https://www.embs.org/pulse/articles/history-convolution-operation/>
- <https://www.allaboutcircuits.com/technical-articles/dsp-applications-of-convolution-part-2/>