Innovationsforståelse

i og med naturvidenskaberne

Tre konkrete og implementerbare eksempler

v./ Steen Markvorsen, DTU Compute

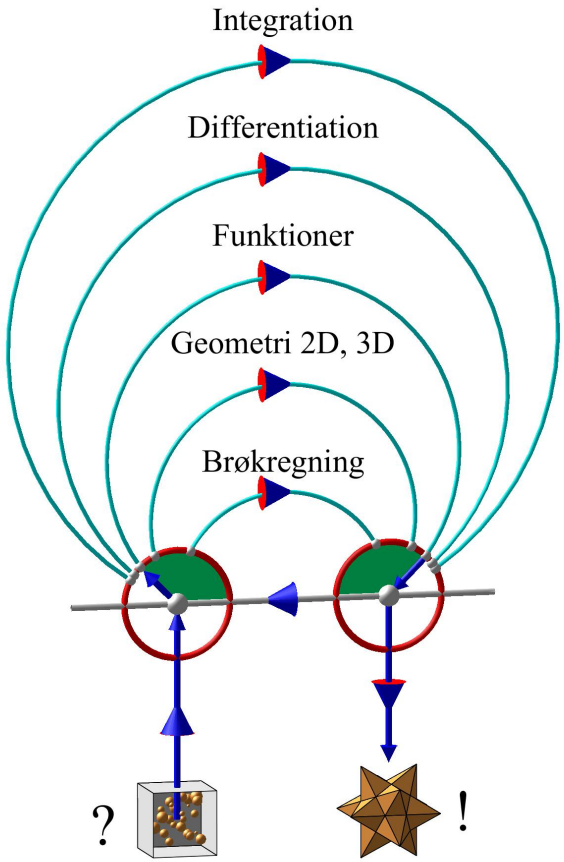
Synopsis

- Ud af boksen
- Modelleringshåndtaget
- Eksempel 3: I Gymnasiet
- Eksempel 1: På DTU og i Industrien
- Eksempel 2: For Verden

Matematiksamspillet – her med fysik

–	Kernestof Matematik	Genbrug	Samspil med Fysik
I	Regningsarterne	Brøker	Enheder; 10^n; Skalaer
II	Geometri 2D; Vektorer; IT	I	Figurer; Kræfter; Ligevægt; Newton
III	Geometri 3D; Vektorer; IT	I, II	Figurer; Kinematik; Dynamik
IV	Simple funktioner; IT	I, II, III	Approksimationer; Fejl; Kast; Vækst(I)
V	Model-funktioner; IT	II, III, IV	Vækst(II); Rotationer; Banekurver
VI	Funktionsanalyse; IT	I, IV, V	Ligevægt; Optimering; Vækst(III)
VII	Integraler; IT	II, IV, V, VI	Længde; Masse; Energi; Arbejde

Matematik-motoren i samspillene

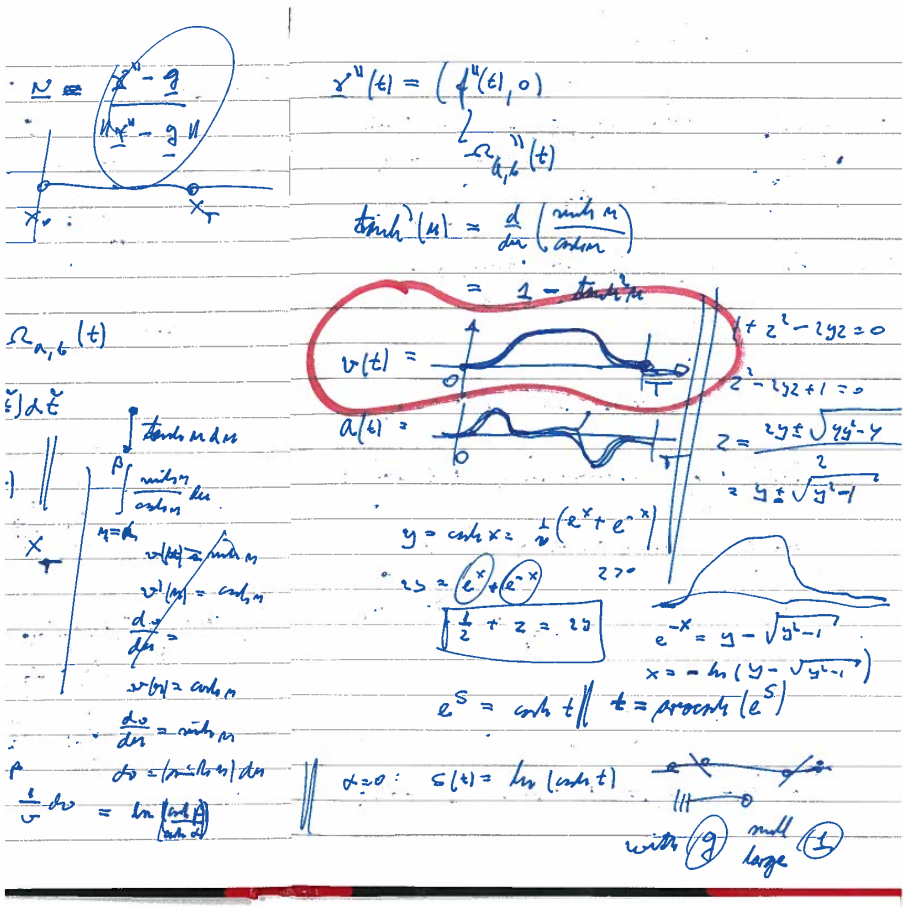


Eksempel 3 – i Gymnasiet

Innovationsporteføljer hen imod et SRP

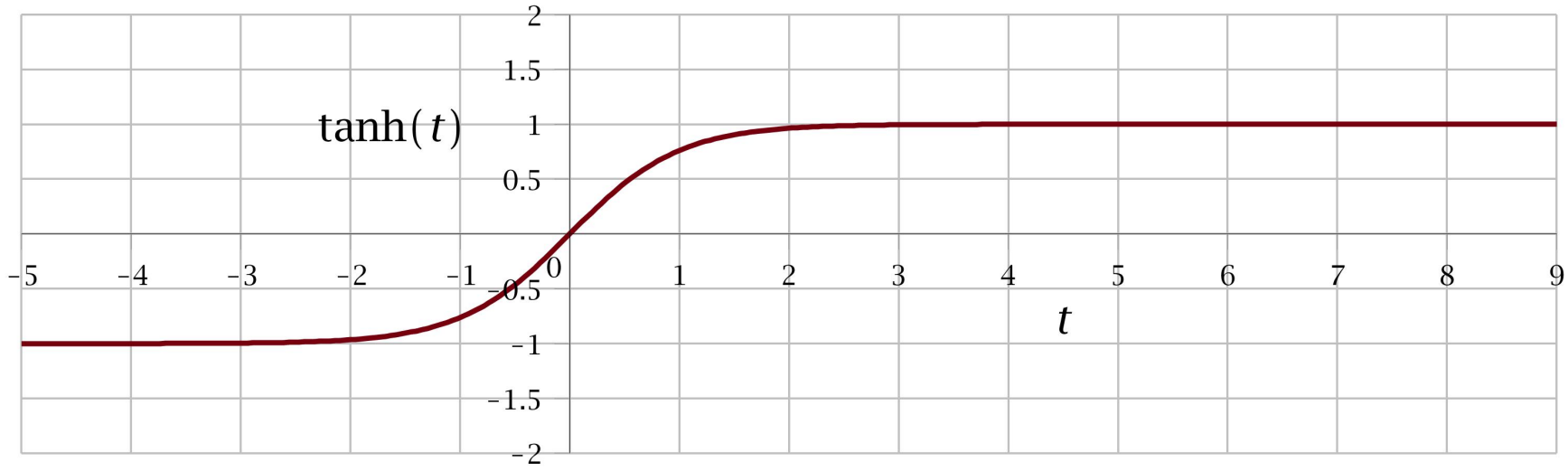
Vedr.: ”Den elevfaglige innovationsforståelse”

En fart-profil



Hvilken funktion?

En fart-profil?



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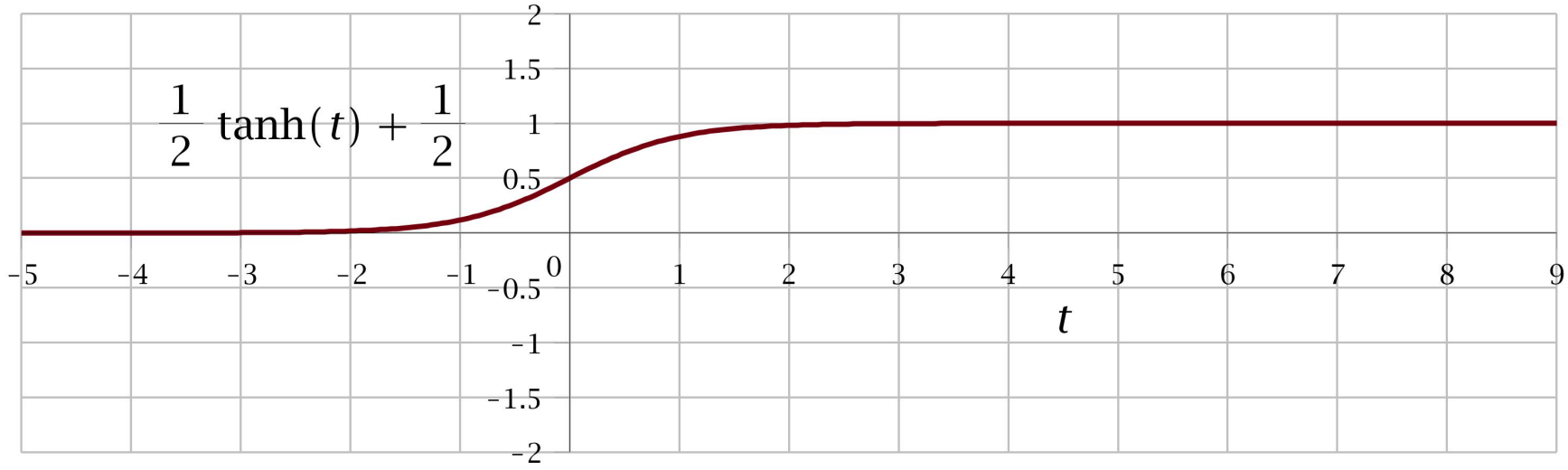

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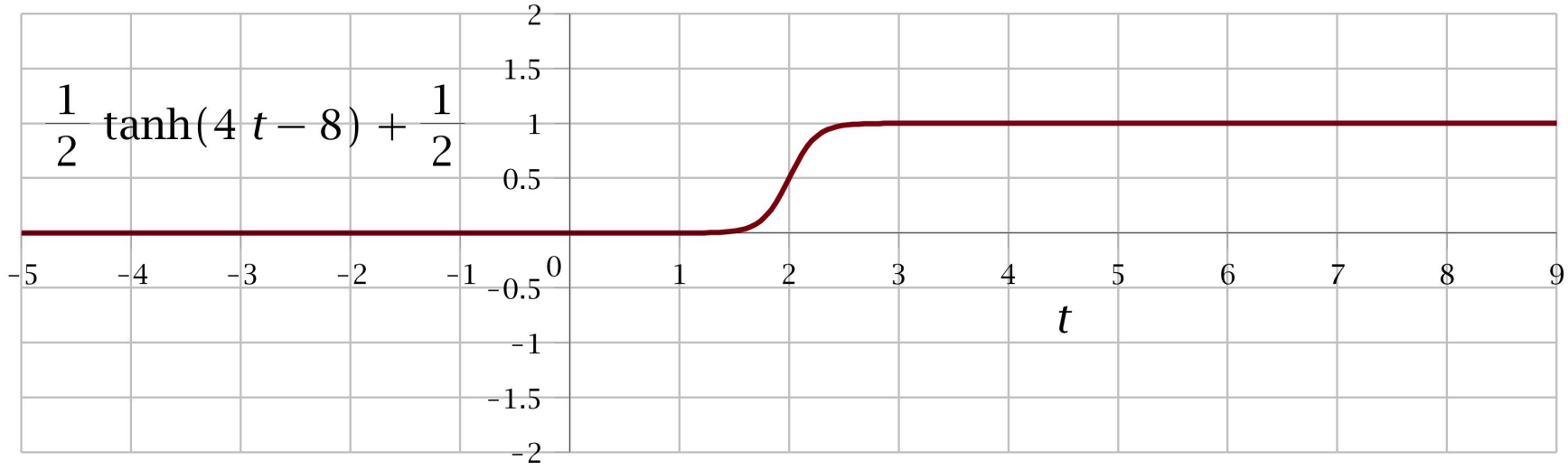

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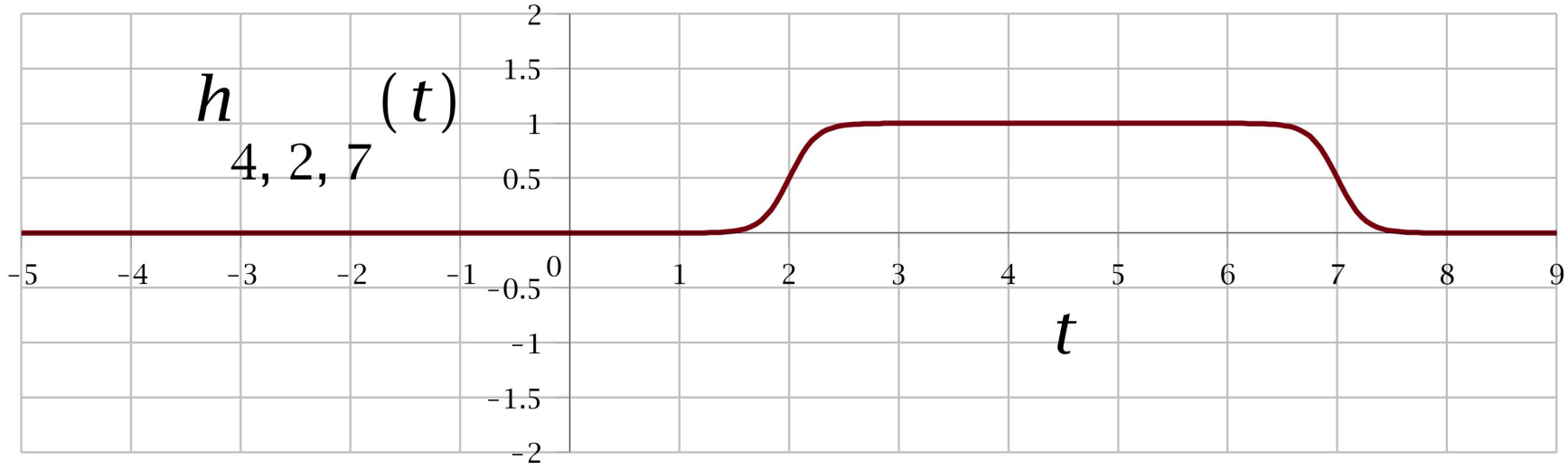

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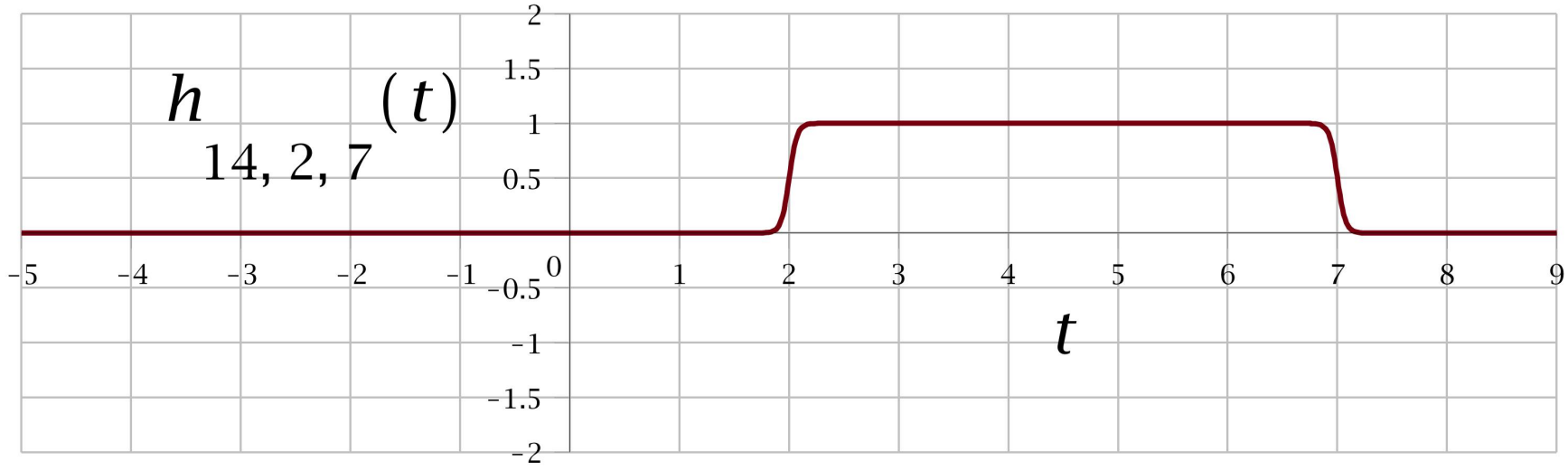
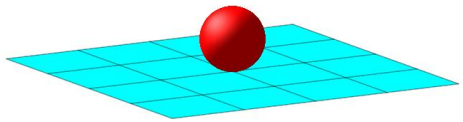


Implementeret fartprofil



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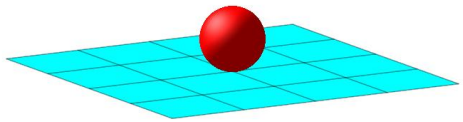

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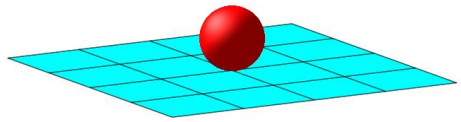

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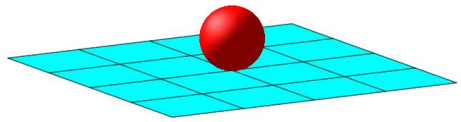

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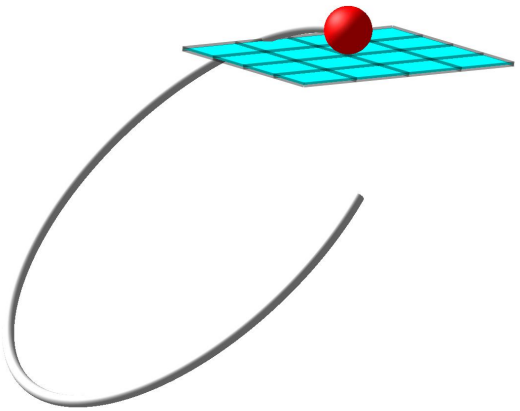

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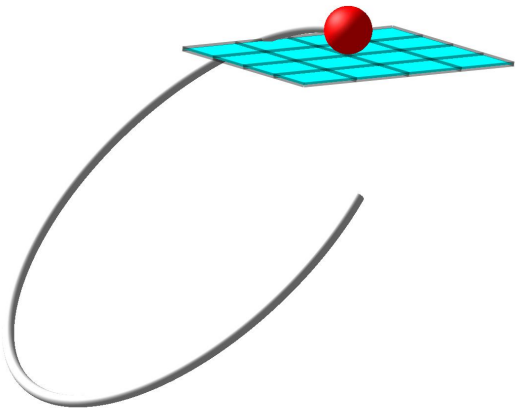

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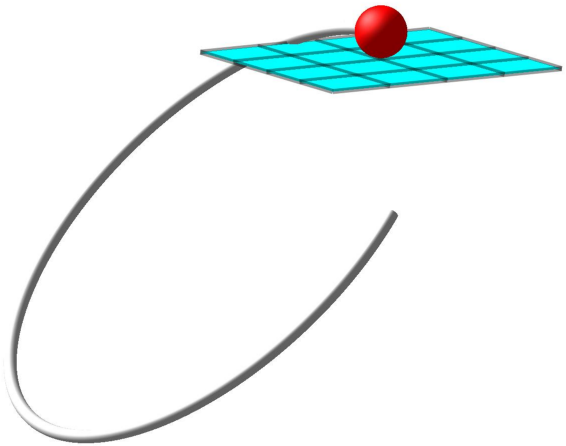

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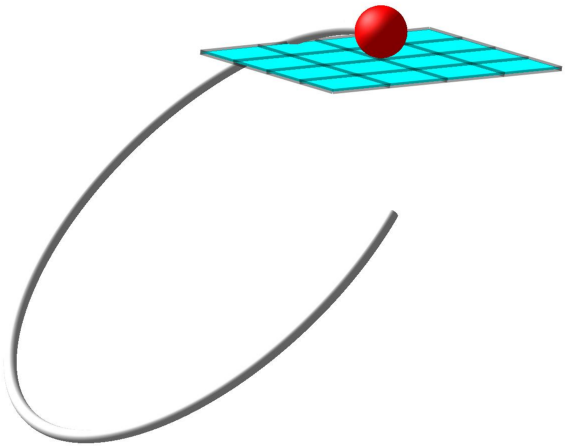
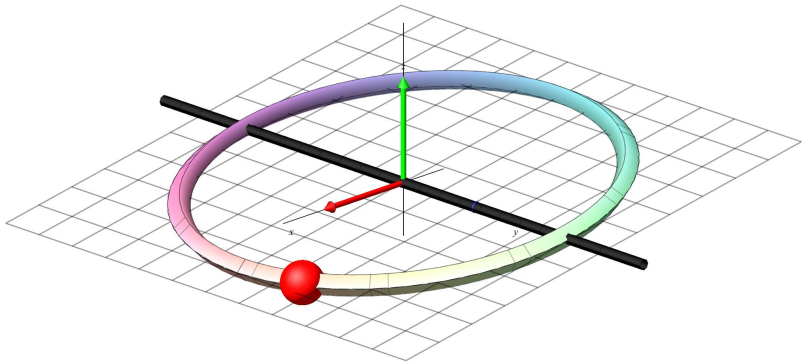


En karrusel



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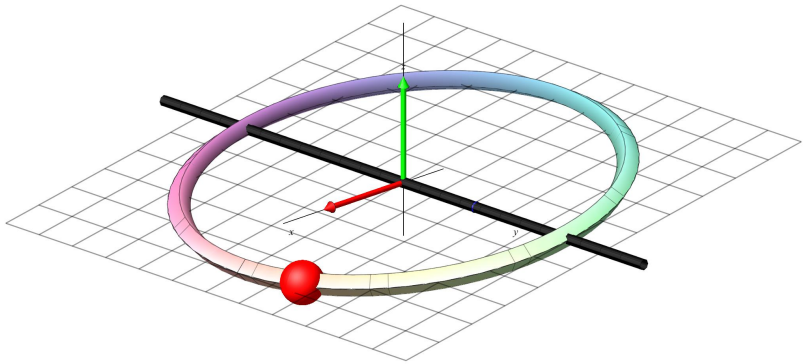


SRP opgaver og andet godt

http://www.dtu.dk/Samarbejde/Gymnasier-og-skoler

Eksempel 1 – på DTU og i Industrien

Matematikken implementeres

Vedr.: ”Den markedsorienterede innovationsforståelse”

Bladerunner

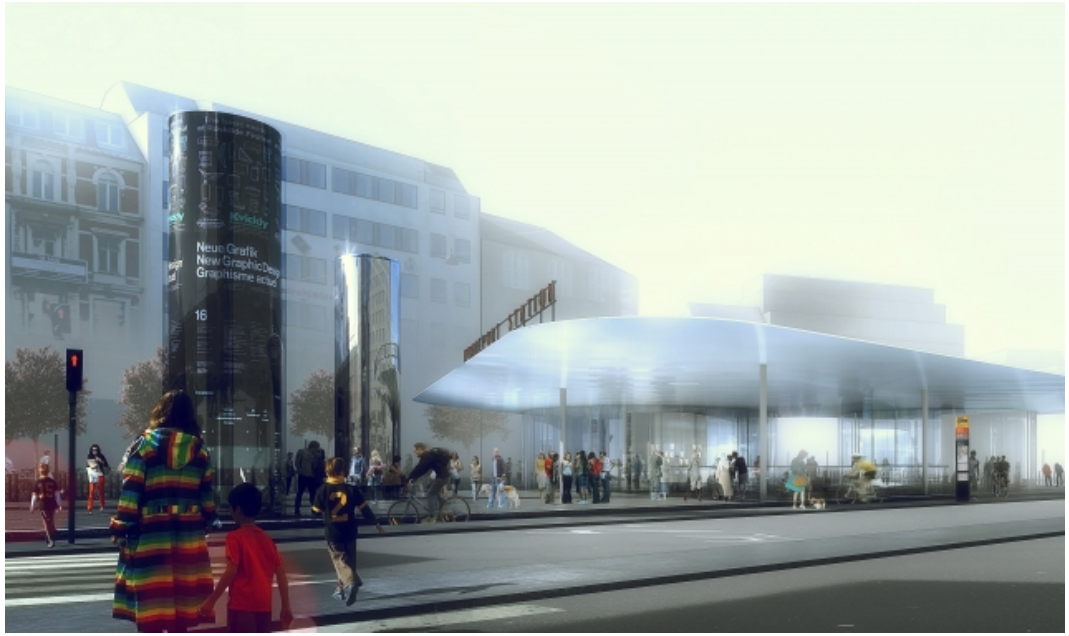
Støttet af Innovationsfonden

- Budget : 24 mio. kr.
- IF investment : 13 mio. kr.
- Period : 2013 – 2016

Partners

- Odico ApS, Odense
- DTU Compute, incl. 2 Ph.D. students
- DTU Mechanics, incl. 1 Ph.D. student
- Confac A/S, Randers
- 3XN A/S, Copenhagen
- Danish Technological Institute, Robot Technology

Concepts and ideas



Concepts and ideas

Concepts and ideas

Concepts and ideas

This procedure is :

- Ad hoc
- Imprecise
- Messy, dirty
- Time-consuming
- and very Costly

New idea : RHWC

Robotic Hot Wire Cutting in EPS

New idea : RHWC

Robotic Hot Wire Cutting in EPS

New idea : RHWC

Robotic Hot Wire Cutting in EPS

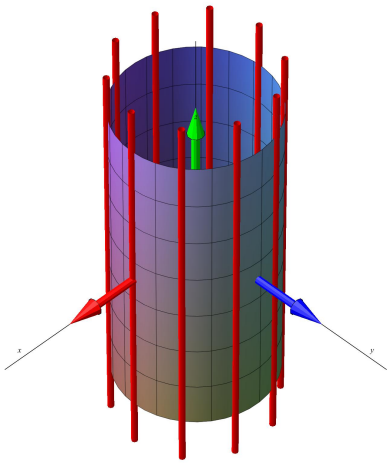
New idea : RHWC

This procedure is :

- Automatic
- Precise
- Clean
- Fast
- and relatively in-expensive

New idea : RHWC

–but also geometrically limited:



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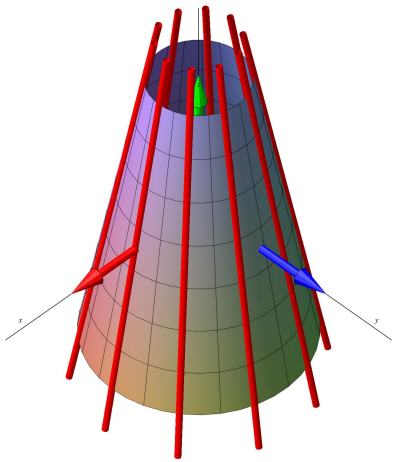

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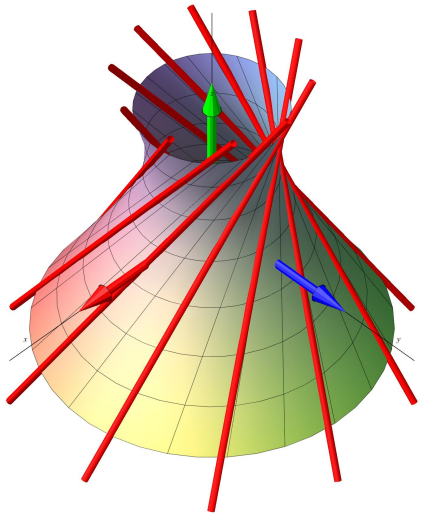

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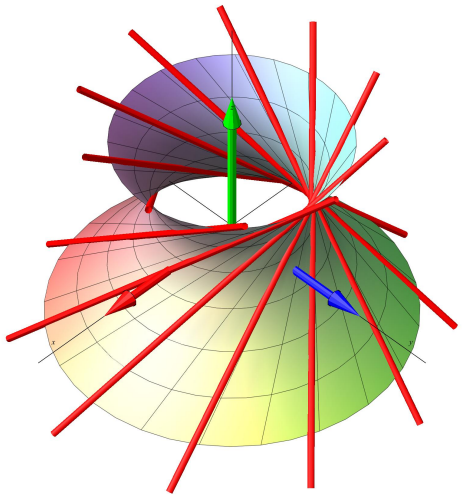

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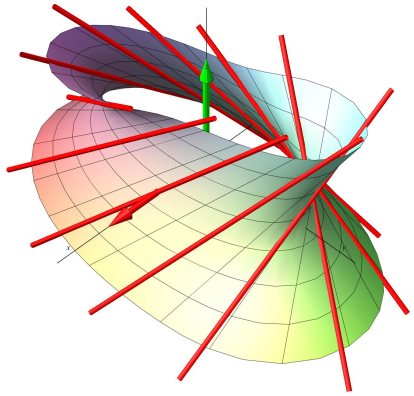

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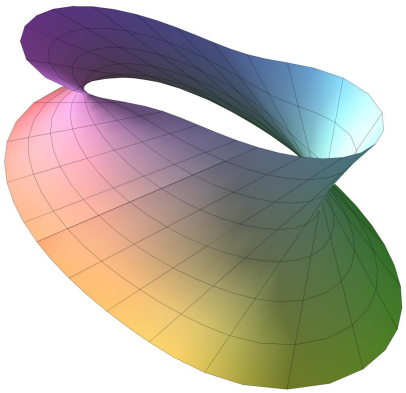
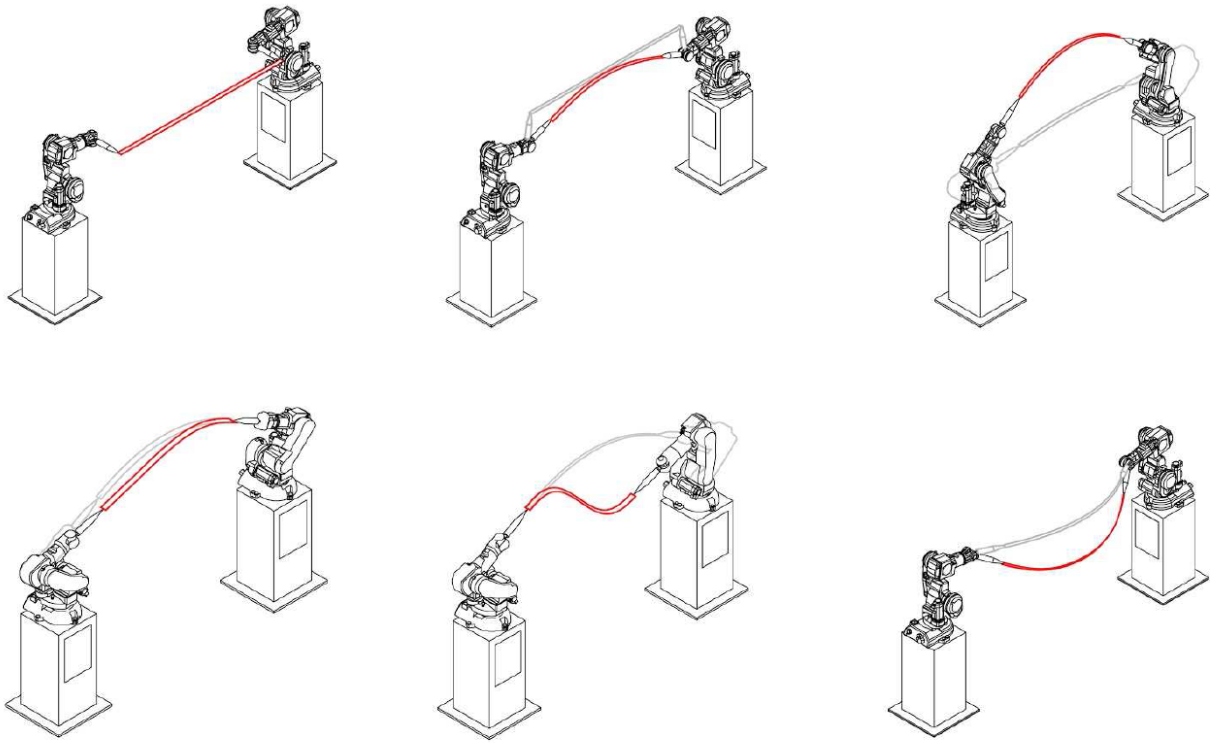


Better idea : RHBC

Robotic Hot Blade Cutting in EPS



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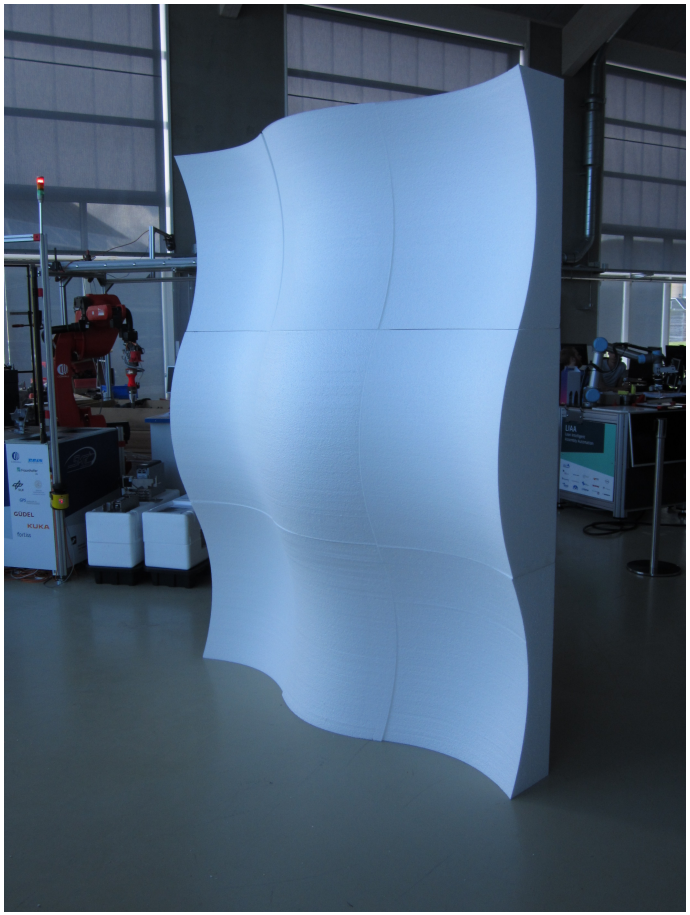
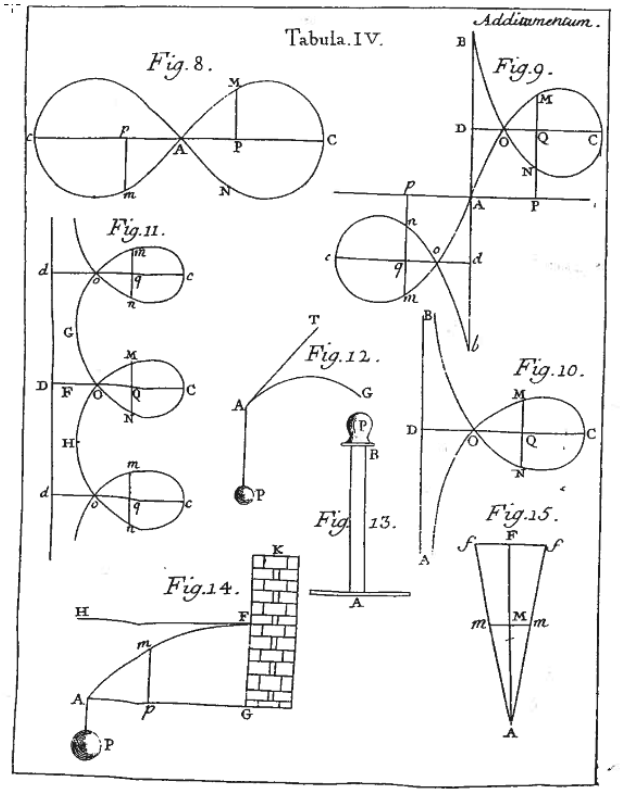


Better idea : RHBC

Curves of the blade: Aprés L. Euler (1740):



Eksempel 2 – for Verden

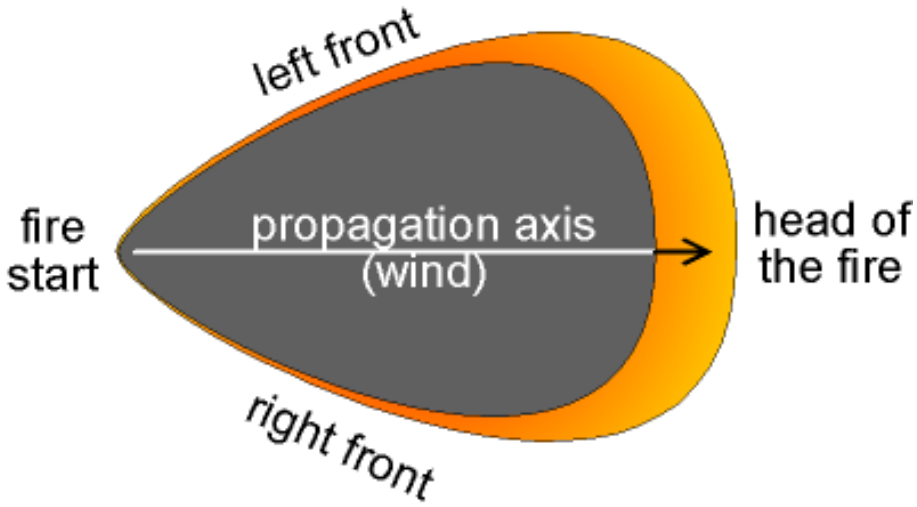
Matematikken redder klimaet

Vedr.: ”Den alment orienterede innovationsforståelse”

Wildfire modelling

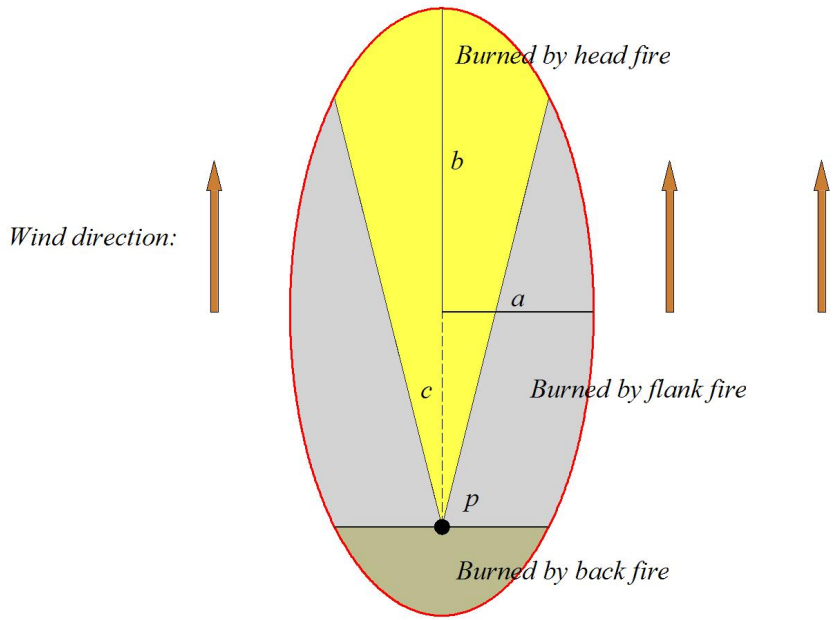
https://en.wikipedia.org/wiki/Wildfire

Wildfire modelling

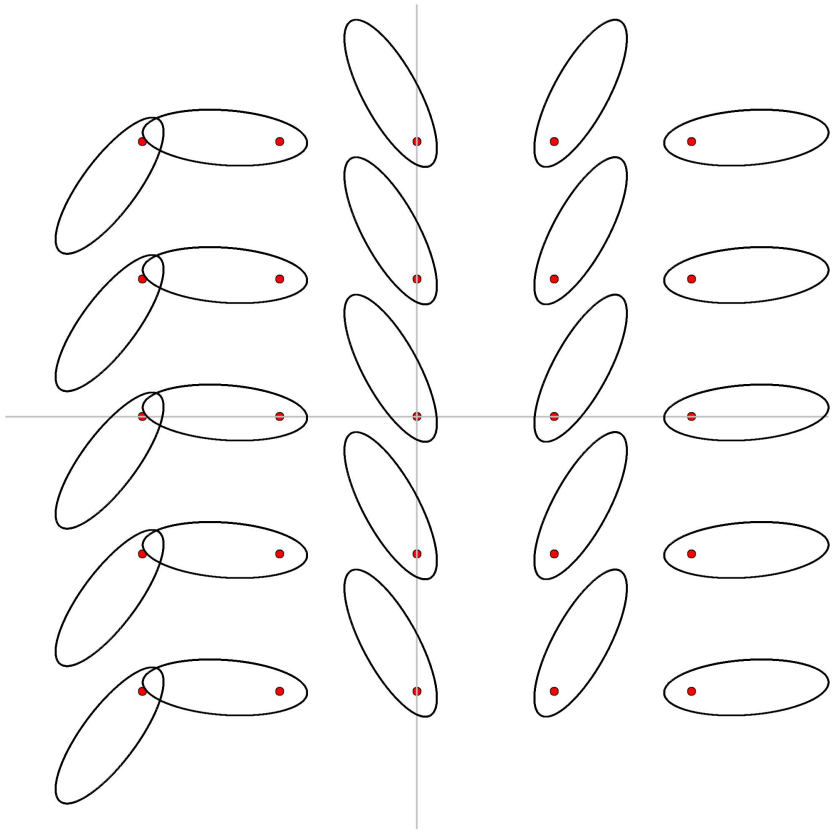


Wildfire modelling

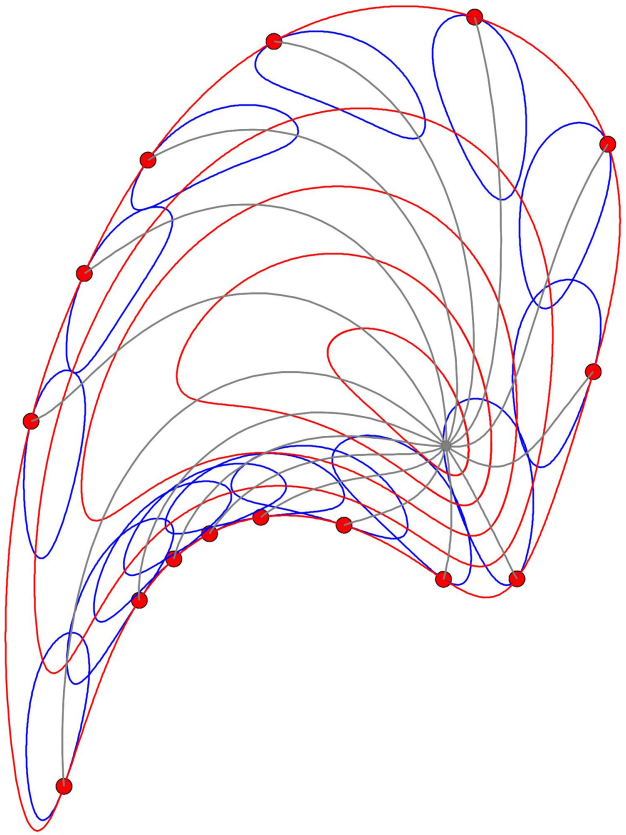
Wildfire modelling



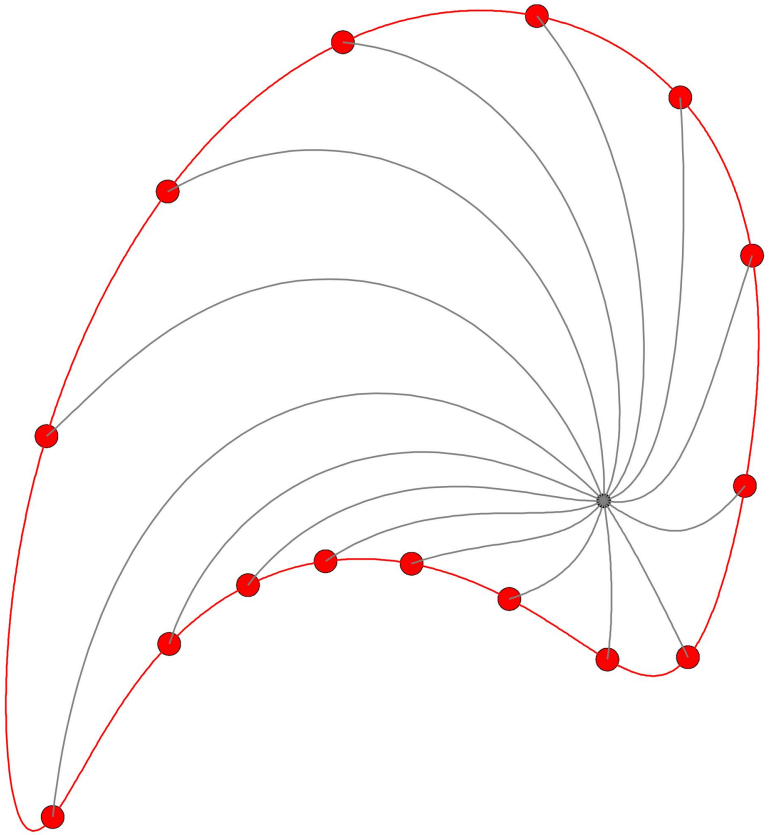
Wildfire modelling



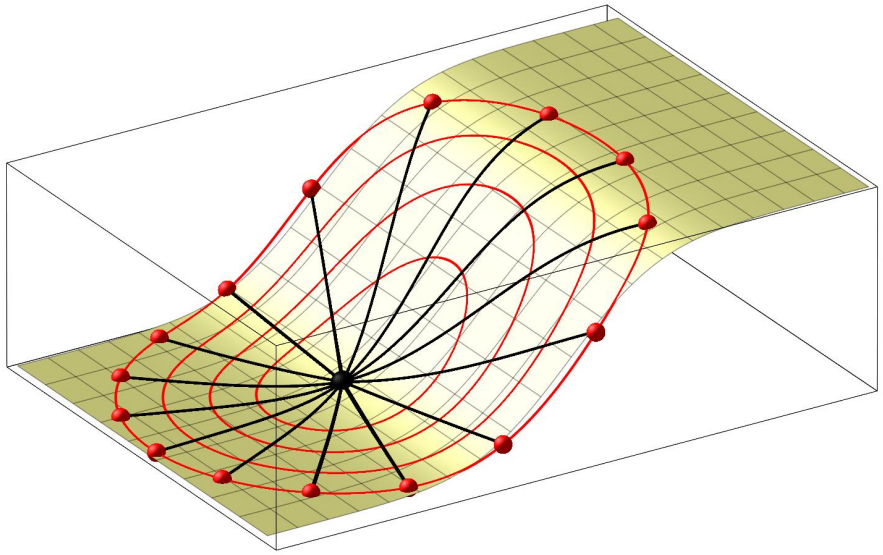
Wildfire modelling



Wildfire modelling



Wildfire modelling



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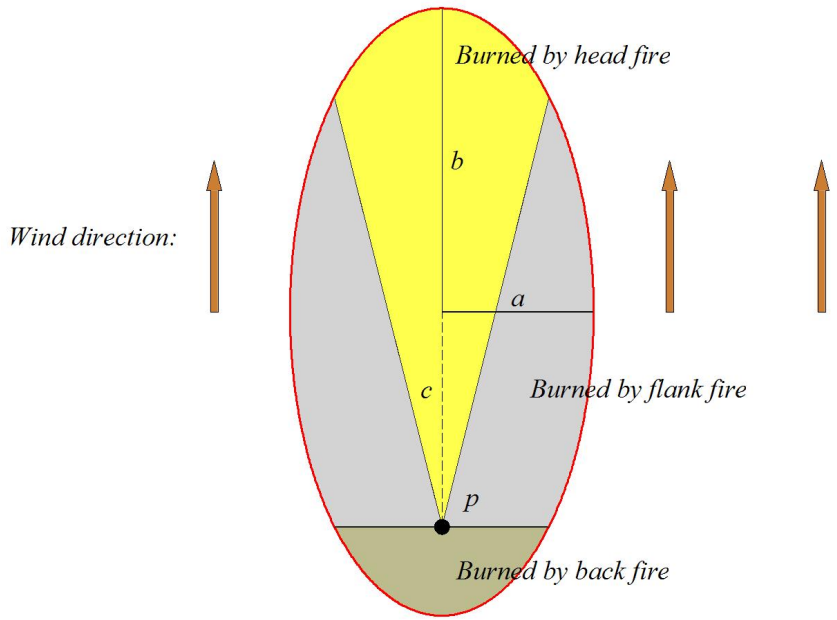
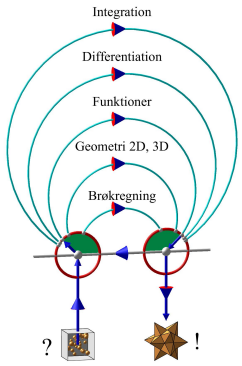


Tak for opmærksomheden!

Kommentarer, spørgsmål?



Fra DTU til lærere og elever

Et tilbud fyldt med innovations-gnister:

http://www.dtu.dk/Samarbejde/Gymnasier-og-skoler

Specifikke links:

- Til lærere
- Til elever

Flere links:

- EMU-Portalen
- EMU: Om innovation i Matematik
- EMU: Om innovation i Fysik
- http://engineerthefuture.dk/