

# Surface Detection and Segmentation

**Dahl, Vedrana Andersen**

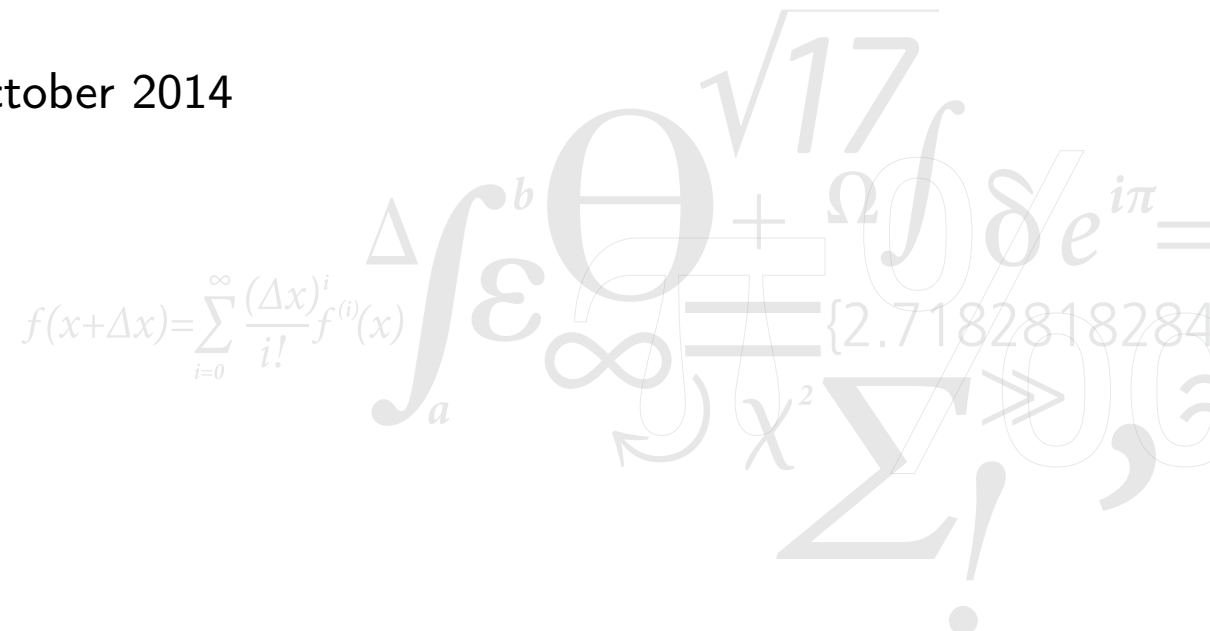
*Publication date:*
2015

*Document Version*
Peer reviewed version

# Surface Detection and Segmentation

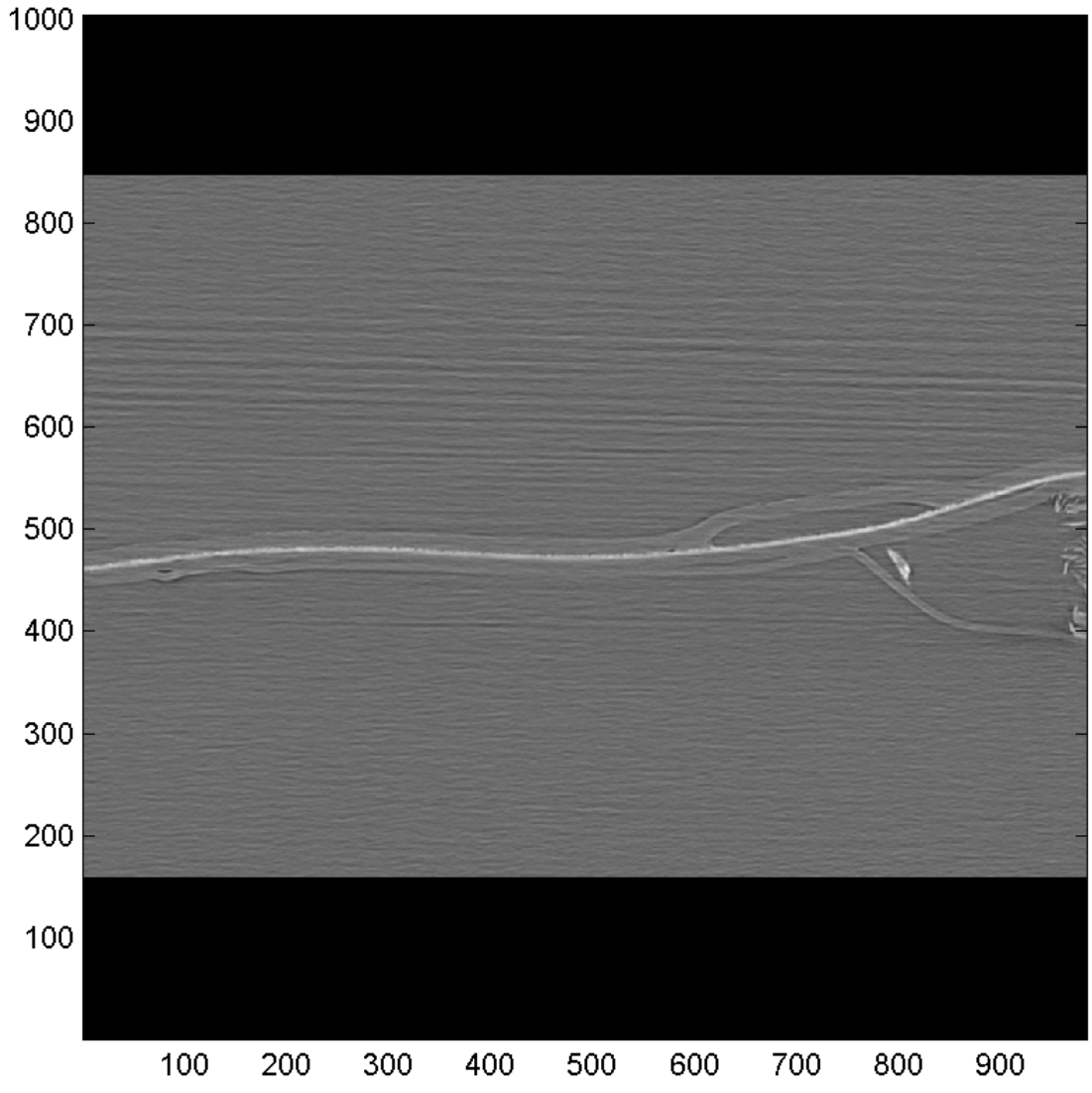
Vedrana Andersen Dahl
DTU Compute

MEK/Compute seminar, 3 October 2014



# Surface detection

# Motivation


1000
900
800
700
600
500
400
300
200
100
100
200
300
400
500
600
700
800
900

# Optimal surface search

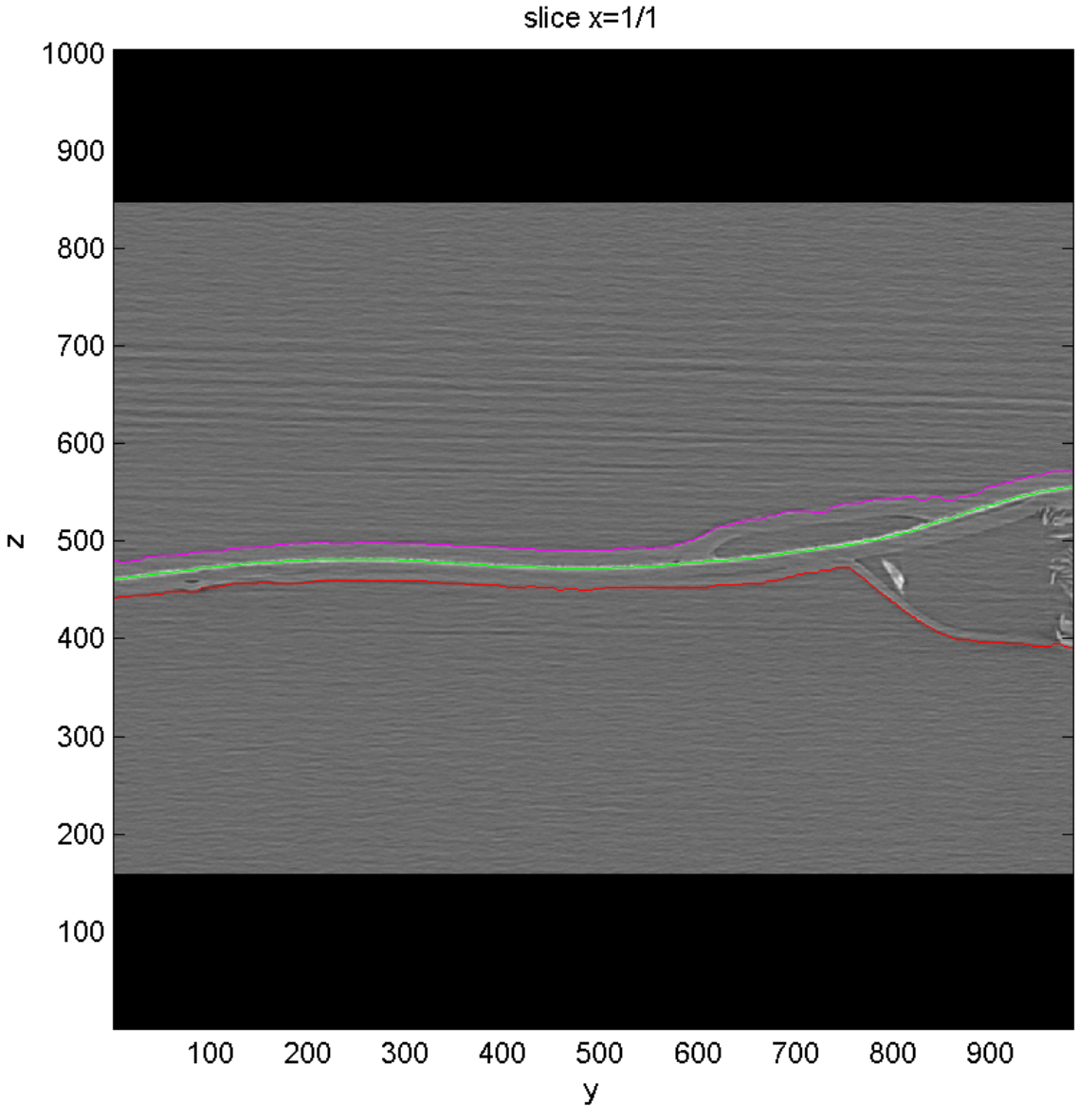
## Problem

- Surfaces in 3D volume
- Local smoothness constraint
- Data suport

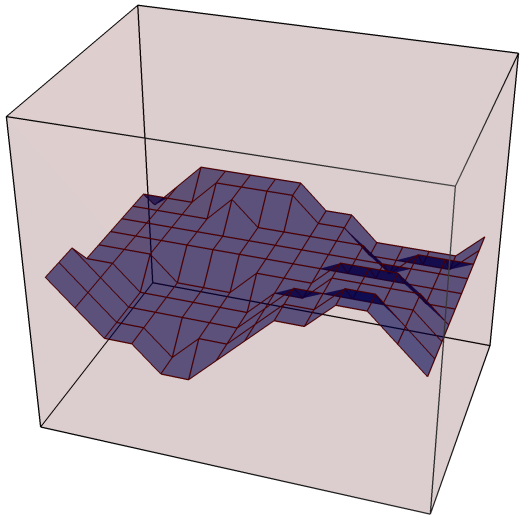
## Solution

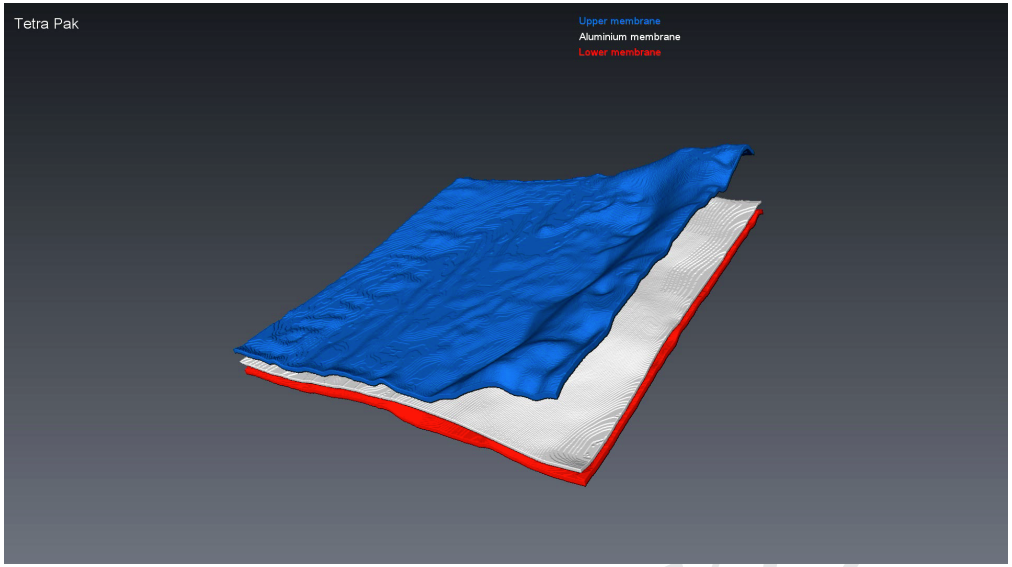
- Graph based
- Flexible

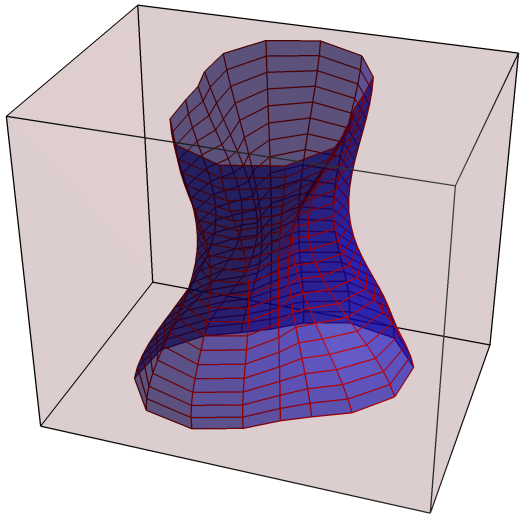
# Tetrapak

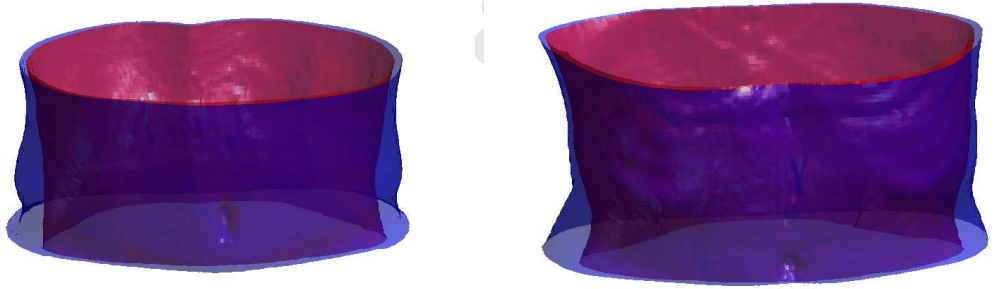

slice x=1/1
1000
900
800
700
600
500
400
300
200
100
z
100
200
300
400
500
600
700
800
900
y

# Terrain-like and tubular surfaces



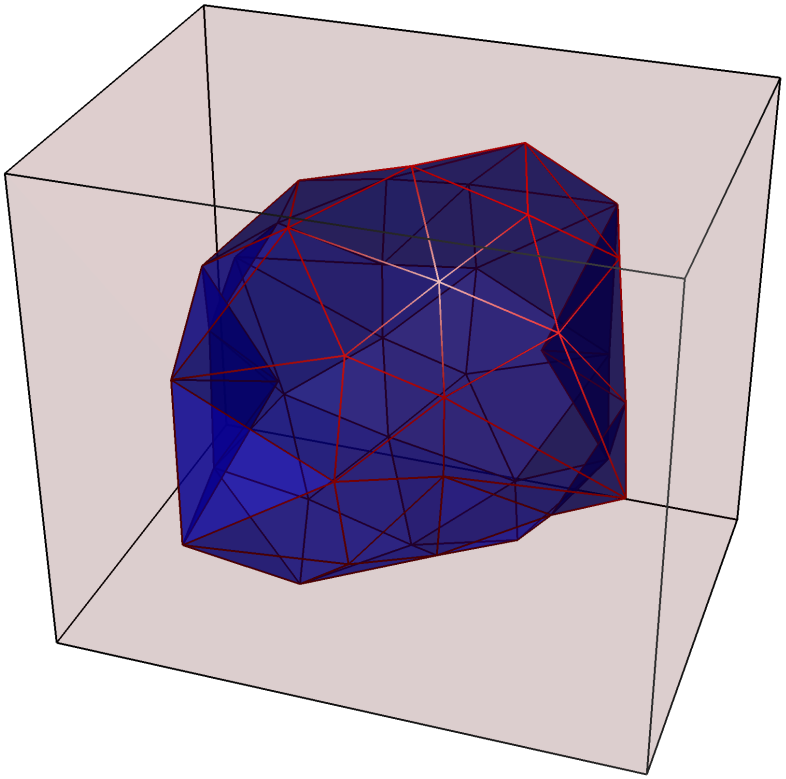


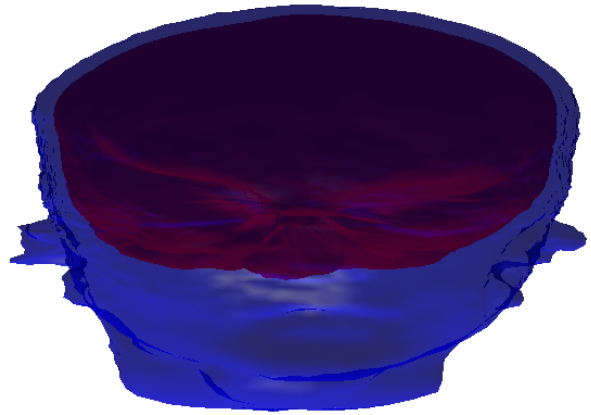


Grid based solution, allows detecting multiple interrelated surfaces

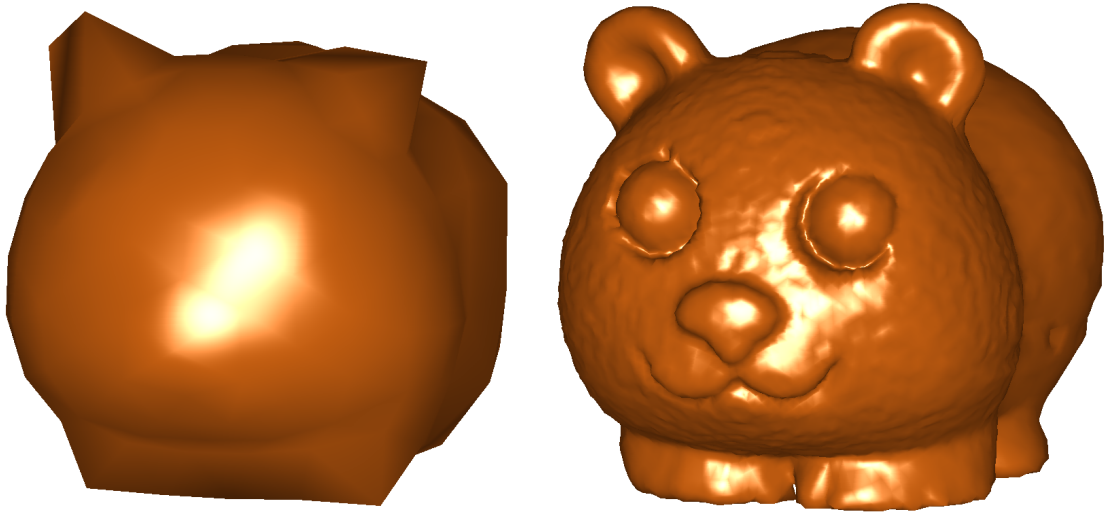
# Round surfaces

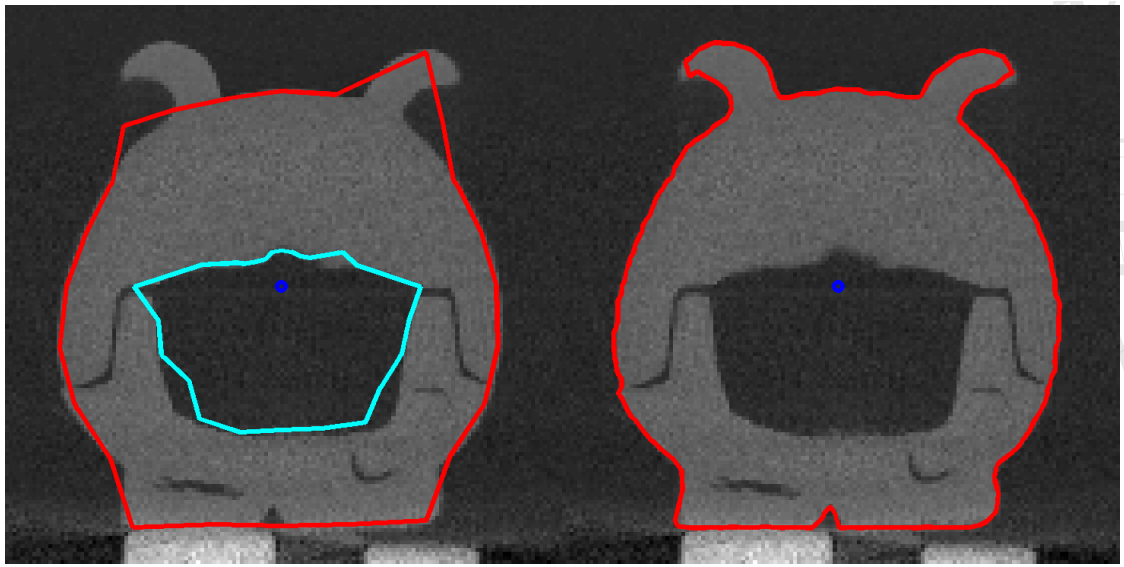


Mesh based solution



# Round surfaces





Allows detecting multiple interrelated surfaces and iterative refinement

# Image segmentation using the deformable simplicial complex method

# Deformable models and DSC

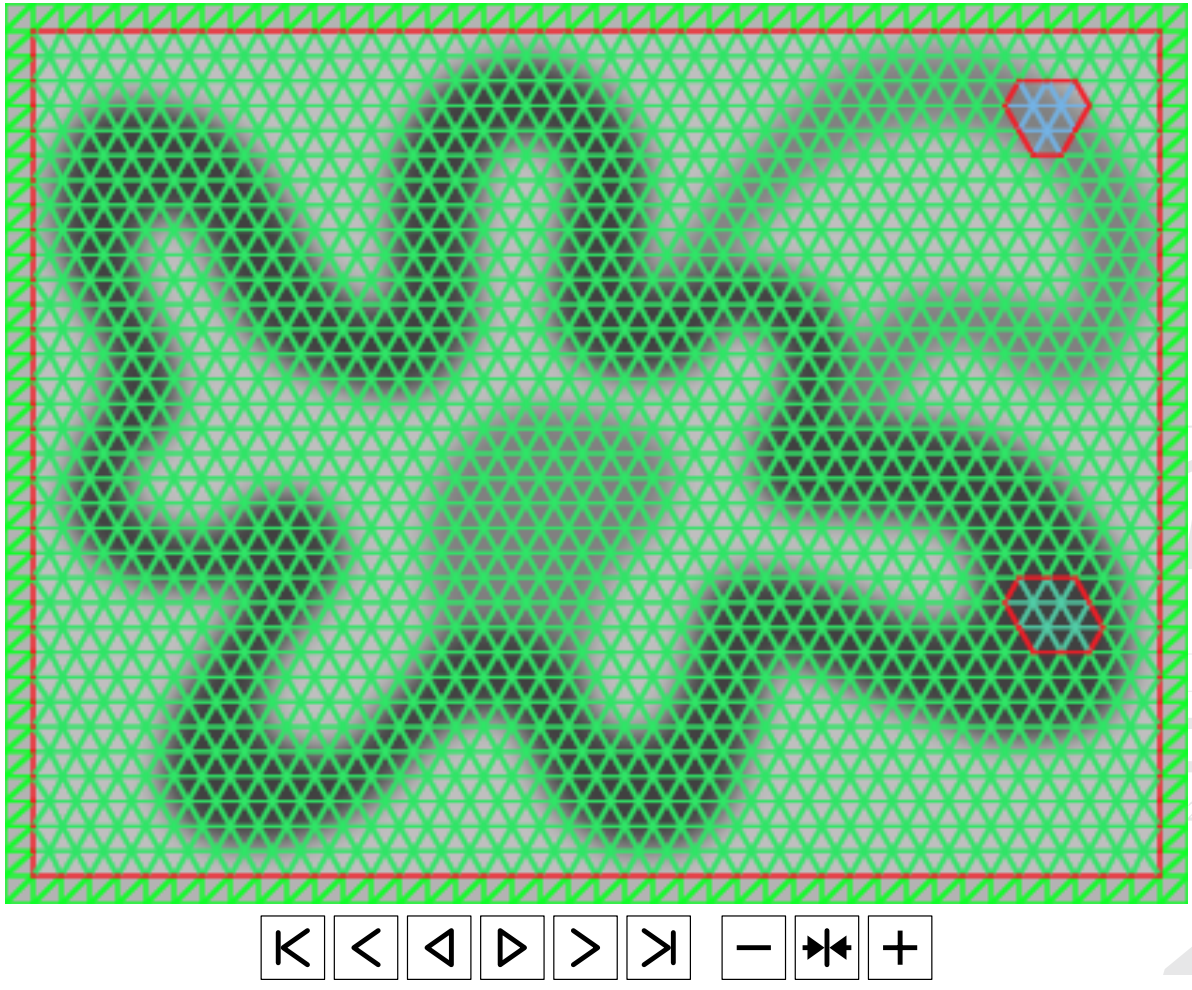
## Deformable models for image segmentation

- Curves or surfaces that can move under: internal forces (smoothness or other prior info) and external forces (image or volume data).
- Depending of the representation of the interface: parametric deformable models (explicit interface, Lagrangian framework) or geometric deformable models (implicit interface, Eulerian framework).

## The deformable simplicial complex method

- generic method for tracking deformable interfaces (curves in 2D, surfaces in 3D)
- applications in fluid simulation, topology optimization, now also image segmentation

# DSC segmentation



Adaptive topology, multi phase support

# The DSC method in 3D

# DSC segmentation current work

- 3D
- Texture segmentation

Thank you!