Reachable Sets for Dubins Car in Control Problems: Physical Visualization

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3D printing parameters

- Material for printing
  - ABS-plastic
  - PLA-plastic
- Diameter of the filament
  - 1.75 mm
- Size of workspace
  - 120 mm x 120 mm x 120 mm
- Thickness of the layer
  - 0.20/0.25/0.30/0.35 mm
- Dimensions
  - 240 mm (width)
  - 340 mm (length)
  - 355 mm (height)
- Weight
  - 6 kg
- Requirements for power
  - 100-240 V, 50-60 Hz, 220W

Some problems of a model

- Correct orientation of normals
- Holes in the grid, “water-impermeability”
- Internal facets
- Overlapping facets
- Common edges
- Geometry of zero thickness

Peculiarities of the FDM-technology of printing

- Wall’s thickness
- Orientation of the object
- Overhanging elements
- Accuracy
- Termo-changing the geometry

Overhanging elements

- For each overhanging element a supporting construction (the support) is necessary.
- The support deforms the surface touching it.

Example of stable support during printing for the reachable set till the instant

Reachable sets at the instant for

T = 0, π/2, π

Example of stable support during printing for the reachable set at the instant

T = 4π

New year tree with 3D reachable sets