30 JULY–3 AUGUST Los Angeles
SIGGRAPH2017

Universiteit Utrecht

NYU

Visual Computing Institute

TECHNION
Israel Institute of Technology

DIRECTIONAL FIELDS

SYNTHESIS, DESIGN, AND PROCESSING

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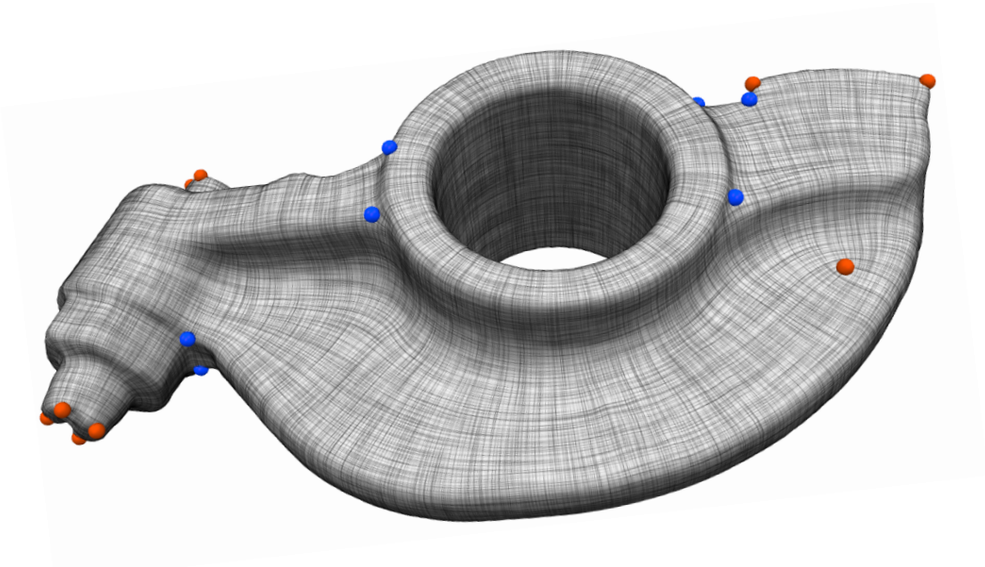
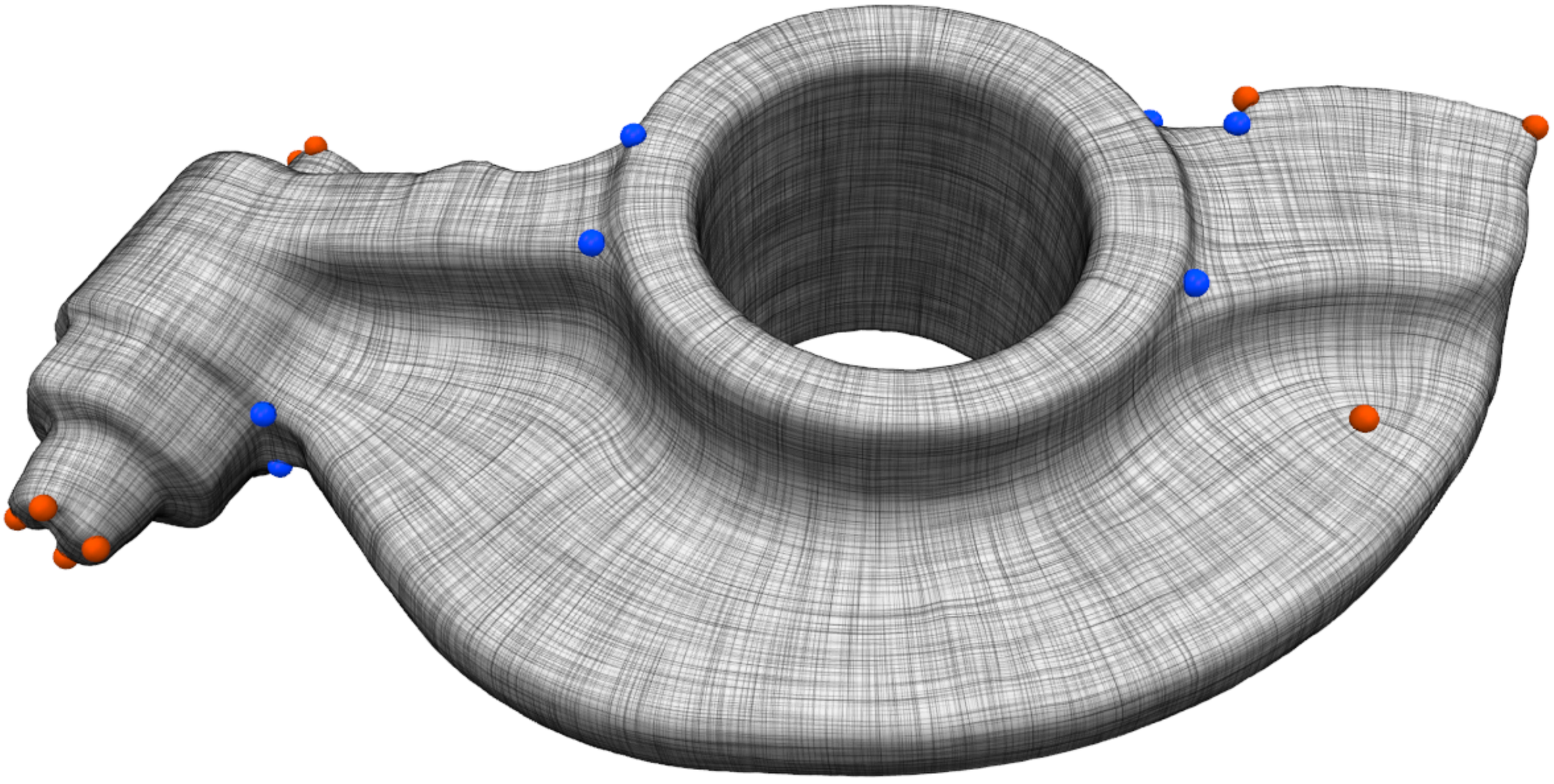


DIRECTIONAL FIELDS



DIRECTIONAL FIELDS

- Directional information per point of a domain
- Various types
  - vector vs. direction (with or without magnitude)
  - one or *N* per point
  - symmetric vs. non-symmetric

DIRECTIONAL FIELDS

- Occurrence in nature






DIRECTIONAL FIELDS

- We are here ***not*** concerned with measuring or analyzing these
- We are interested in the ***synthesis*** of directional fields
  - reproduction/simulation/modeling of natural phenomena
  - abstract mathematical tool for diverse applications
    - meshing
    - deformation
    - fabrication
    - data analysis
    - …

DIRECTIONAL FIELD SYNTHESIS

- This area of research has undergone significant development in past 10 years
  - technical novelties introduced in ~50 papers
- Difficulty:
  newer papers often do not simply supersede previous ones
  - numerous competing approaches for
    - representation
    - discretization
    - optimization
    - formulation of objectives
    - constraining

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No *one-size-fits-all* approach!

OUR MAIN GOAL

- Provide
  - a structured overview
  - clarity about the differences and equivalences
  - a guide to find the best approaches for specific problems

OUTLINE

- Taxonomy
- Discretization
- Representation
- Objectives & Constraints
- Visualization
- Demos, Code *github.com/avaxman/DirectionalFieldSynthesis*
- Open Problems