

High-order Solution Transfer between Curved Meshes and Ill-conditioned Bézier Curve Intersection

Danny Hermes

August 9, 2018

dhermes@berkeley.edu

UC Berkeley



Outline

1. Introduction and motivation
2. Solution Transfer
3. Compensated Evaluation
4. Modified Newton's for Intersection

Introduction and motivation

A Work in Two Parts: Solution Transfer

- Lagrangian Methods
- Remeshing / rezoning
- Mesh adaptivity
- Multiphysics
- Conservation
- Curved and / or High-order

Method of Characteristics

To solve the simple transport equation

$$u_t + cu_x = 0, \quad u(x, 0) = u_0(x).$$

Method of Characteristics

To solve the simple transport equation

$$u_t + cu_x = 0, \quad u(x, 0) = u_0(x).$$

Divide the physical domain via

$$x(t) = x_0 + ct$$

Method of Characteristics

To solve the simple transport equation

$$u_t + cu_x = 0, \quad u(x, 0) = u_0(x).$$

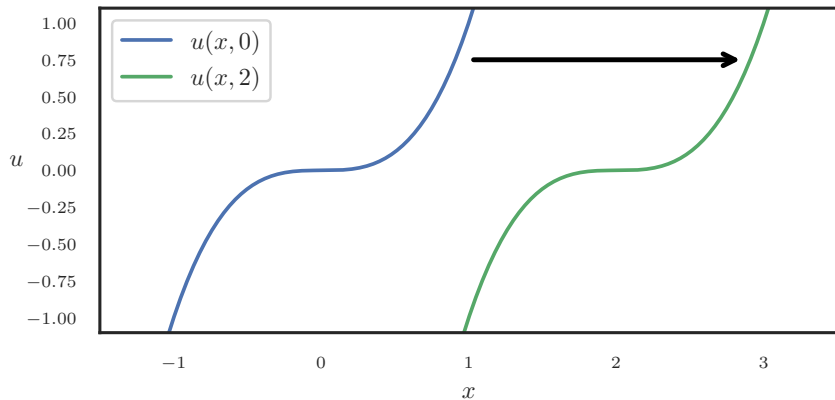
Divide the physical domain via

$$x(t) = x_0 + ct$$

and the PDE becomes a (trivial) ODE

$$\frac{d}{dt}u(x(t), t) = 0.$$

Method of Characteristics



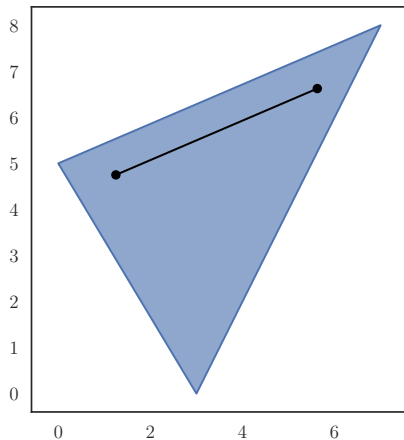
Solution Transfer

Compensated Evaluation

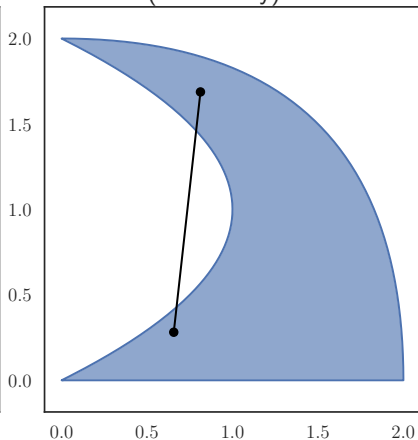
Modified Newton's for Intersection

Difficulties with Curved Elements

Convex

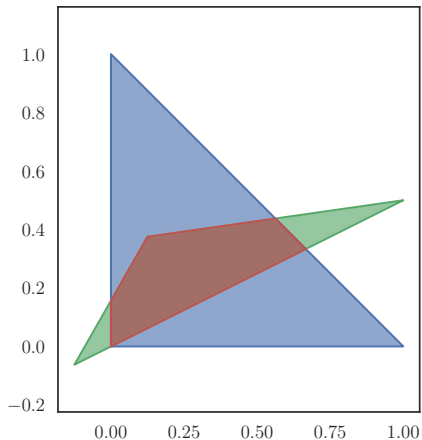


Not (Necessarily) Convex



Difficulties with Curved Elements

Convex Intersection



Multiple Intersections

