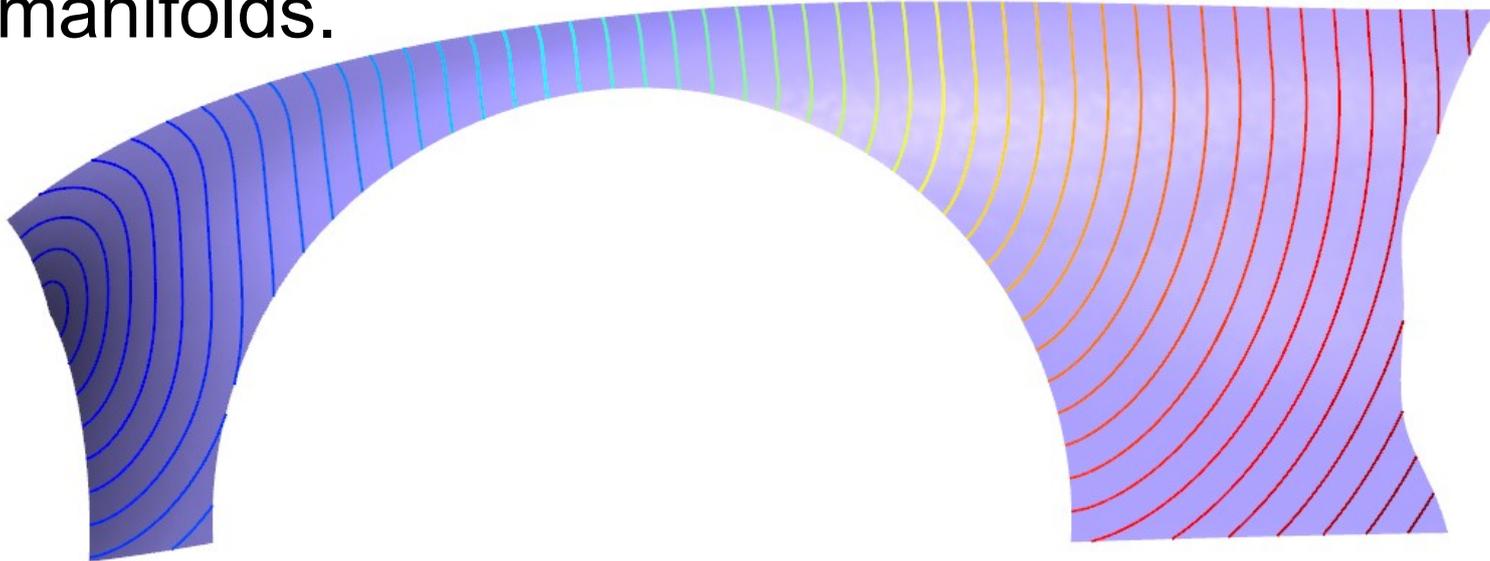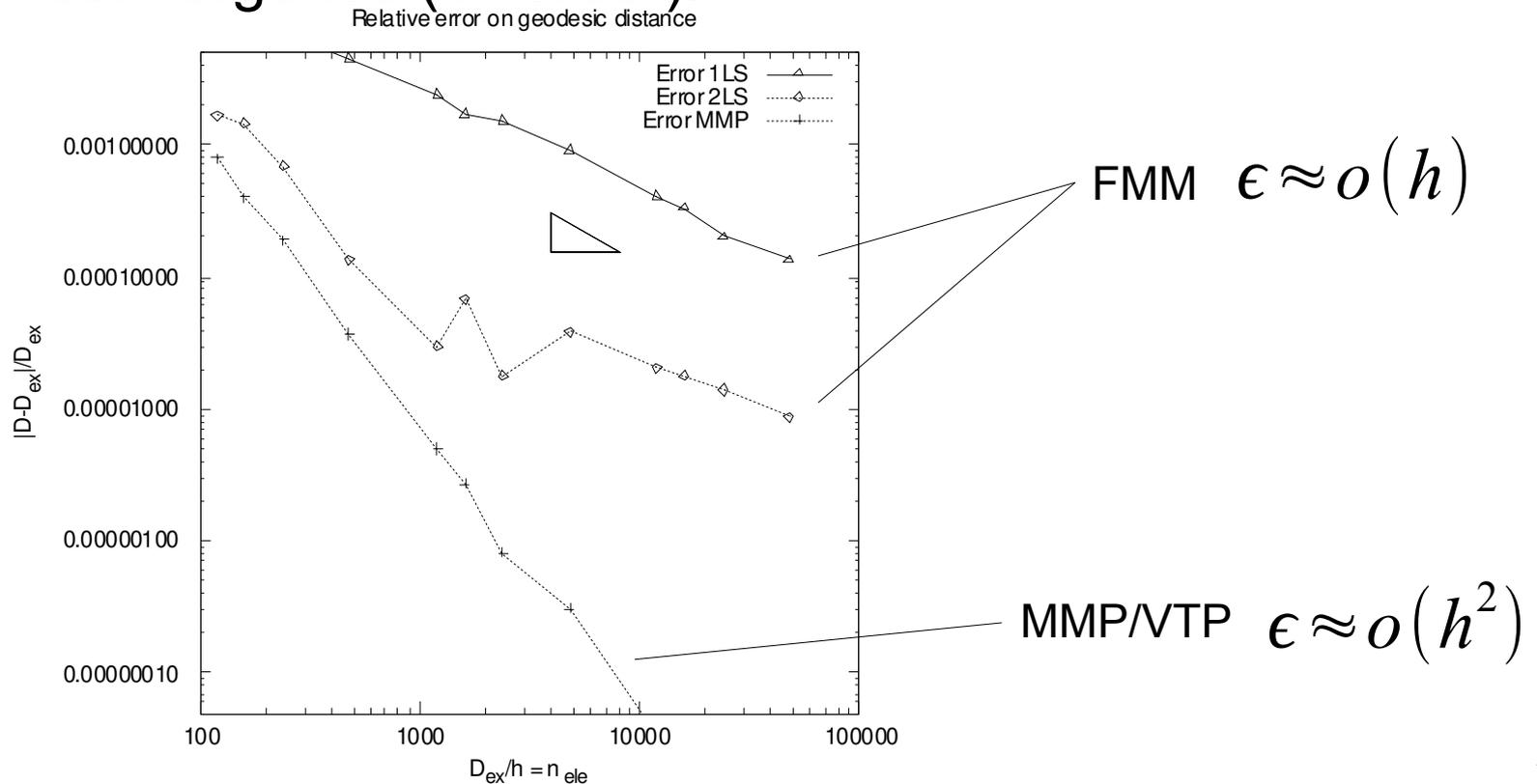# Develop a higher order "fast-marching method" (FMM)

- Sometimes, one needs to measure distances on manifolds.

- Applications include metrology, and many other fields of engineering

Subject 2026 – Level Sets

- Algorithms include the now well known "fast marching method" (FMM), and others (MMP / VTP)

- MMP/VTP have good convergence properties - they are exact on polyhedra, but quite slow and "memory hungry"

- On the other hand, the FMM is quick but suffers a lower oder convergence (1st order).

Relative error on geodesic distance

FMM $\epsilon \approx o(h)$

MMP/VTP $\epsilon \approx o(h^2)$

2

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- Try designing a FMM-like algorithm with better convergence properties, and runtime close to that of the "regular" FMM

  - Runtime of FMM : $n \cdot \log n$

  - Runtime of VTP : more like $n^2 \cdot \log n$