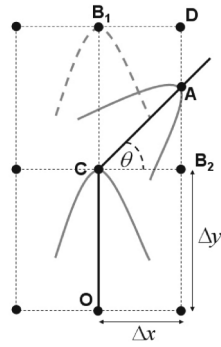
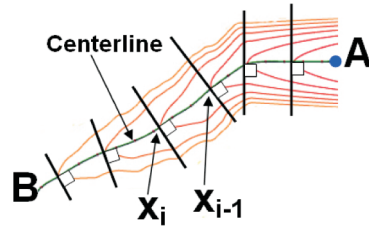


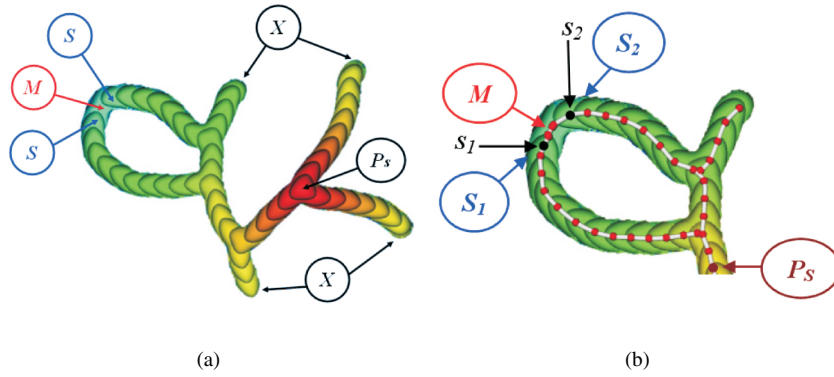
# CHAPTER 13: PDE-BASED THREE-DIMENSIONAL PATH PLANNING



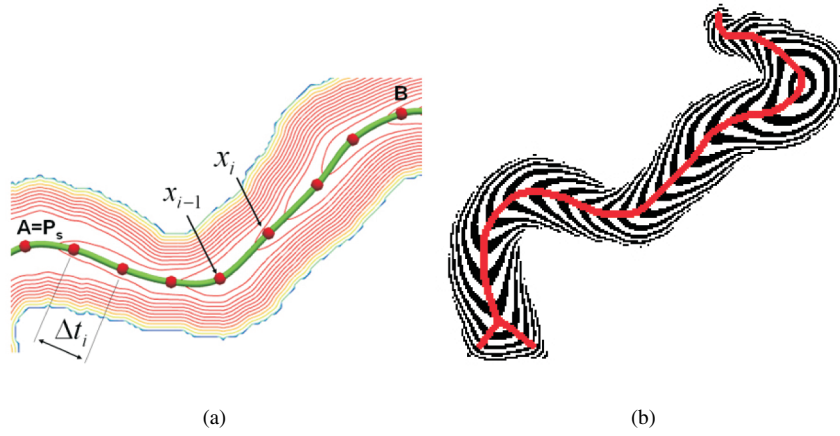
**Figure 1.** The dark line is a medial curve  $\mathcal{MC}$ , while light gray lines are wavefronts. Lattice voxels are represented by solid dots.



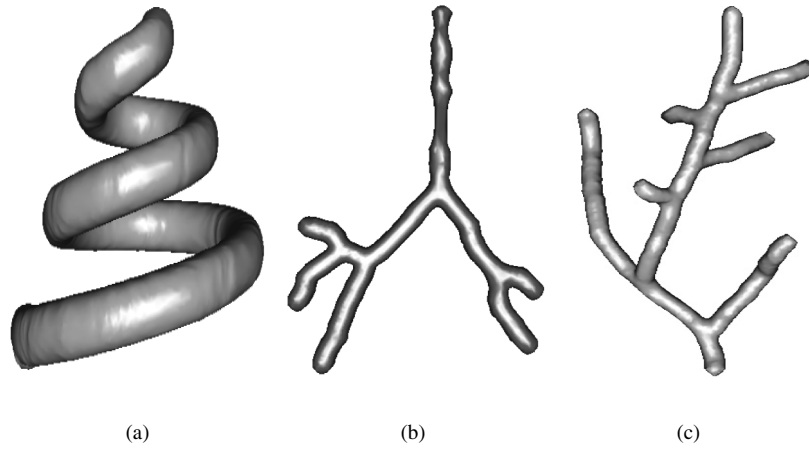
**Figure 2.** A medial curve  $\mathcal{MC}$  intersects the propagating fronts at those voxels of maximum positive curvatures.



**Figure 3.** (a) Cluster Graph. (b) Medial curves around a loop.



**Figure 4.** (a) The  $MC$  of an arbitrary shape consists of  $N$  medial voxels. (b) Cluster graph of the same shape.



**Figure 5.** 3D synthetic shapes of different complexity: (a) spiral, (b) simple tree (in-plane), and (c) complex tree.

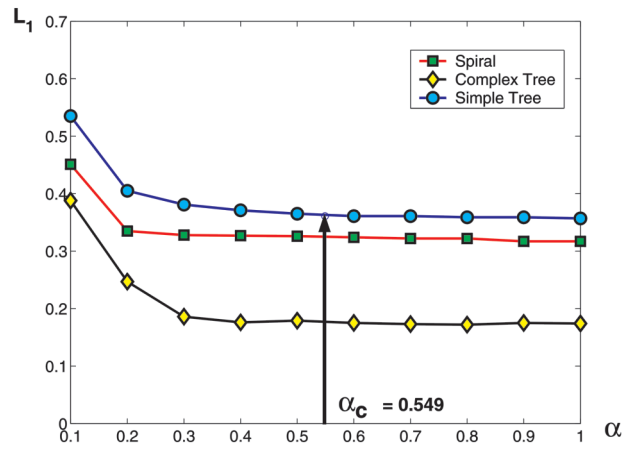
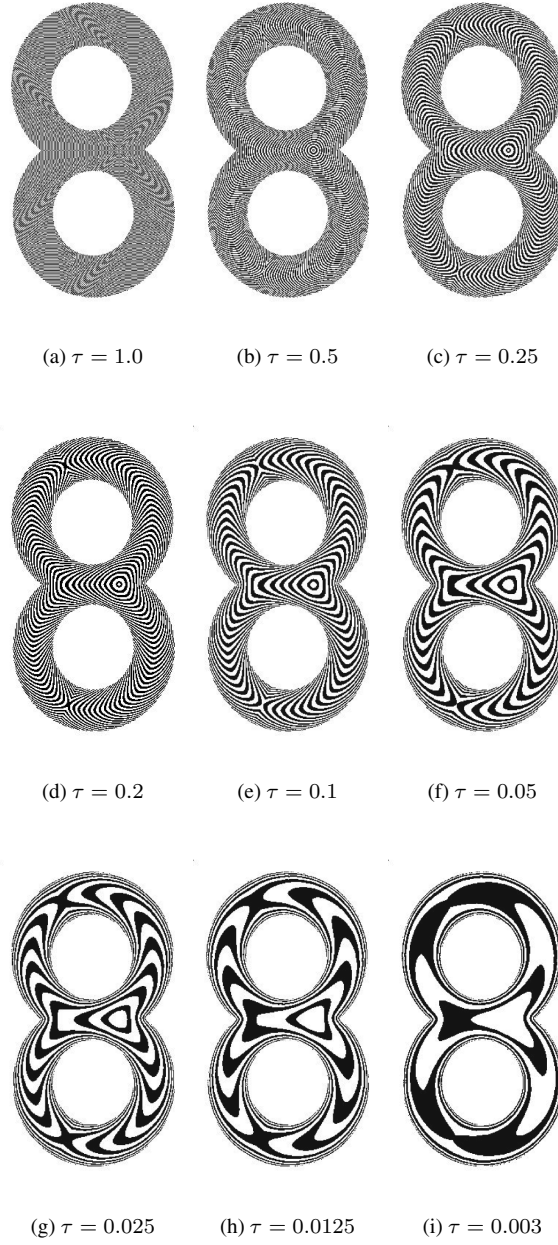
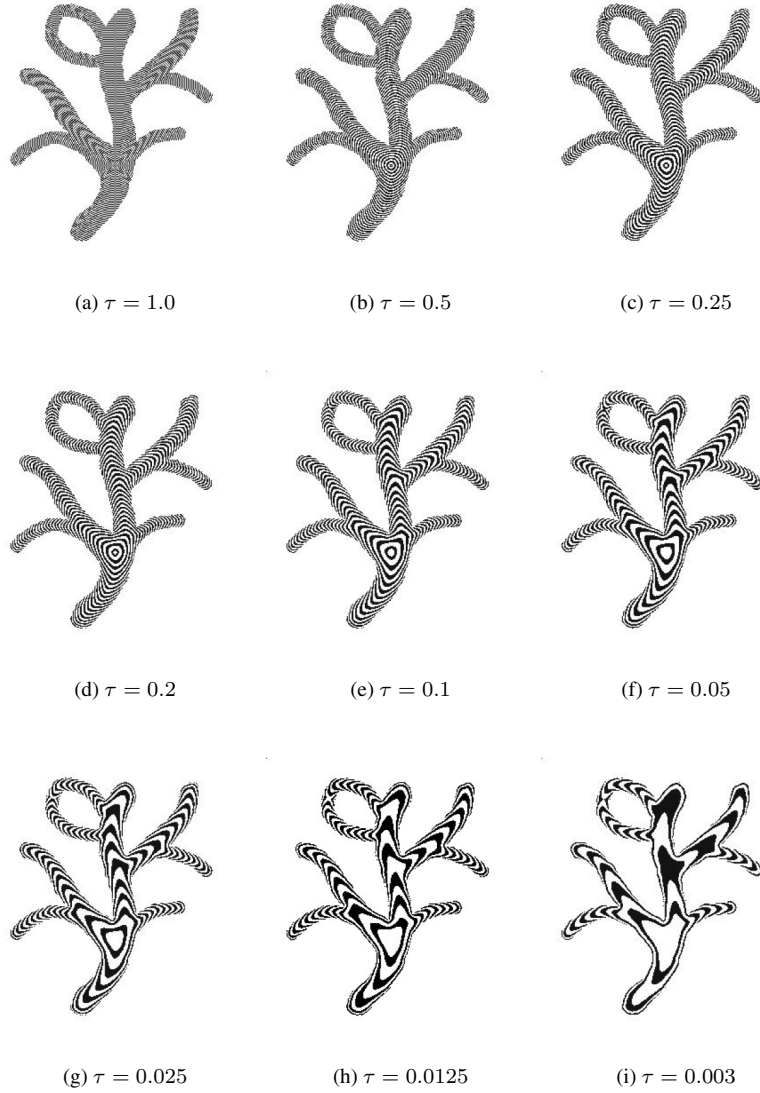


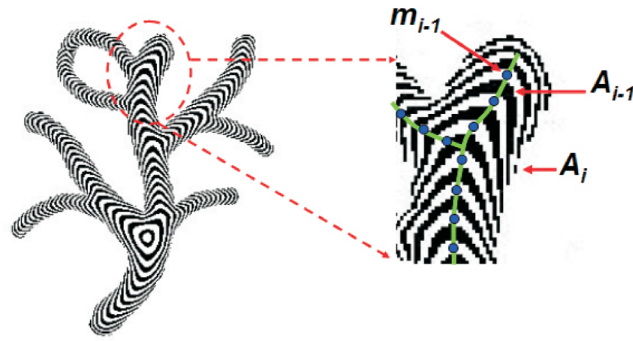
Figure 6. Computed  $L_1$  error of various synthetic shapes under different values of  $\alpha$ .



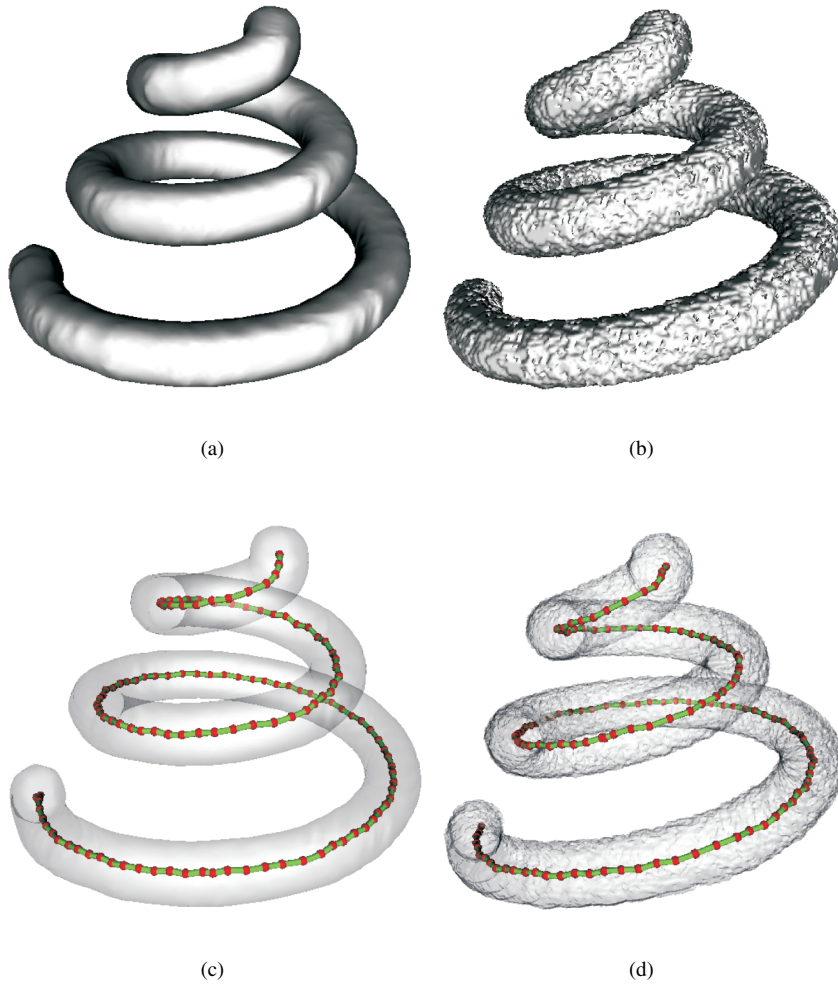
**Figure 7.** Cross-sections in the cluster graph of a 3D synthetic shape (double donuts) under different values of  $\tau$ .



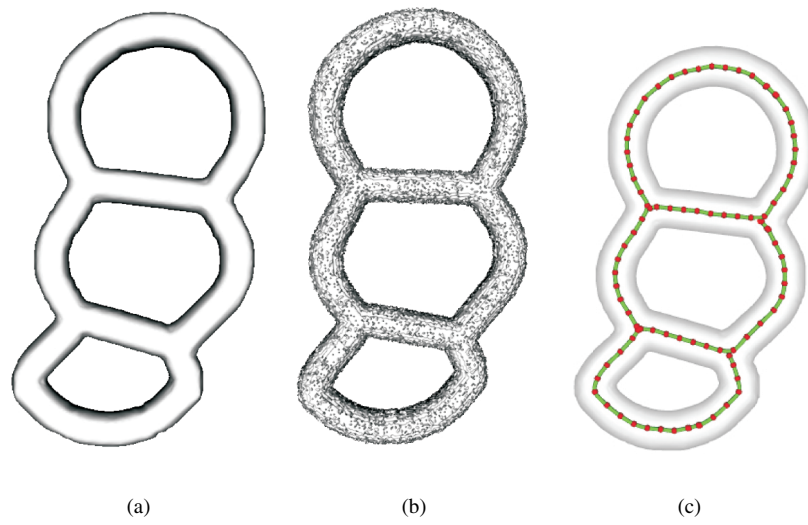
**Figure 8.** Cross-sections in the cluster graph of a 3D synthetic shape (Tree) under different values of  $\tau$ .



**Figure 9.** Each extreme node is identified not from its corresponding extreme cluster  $A_i$  but from its successor neighbor  $A_{i-1}$ .

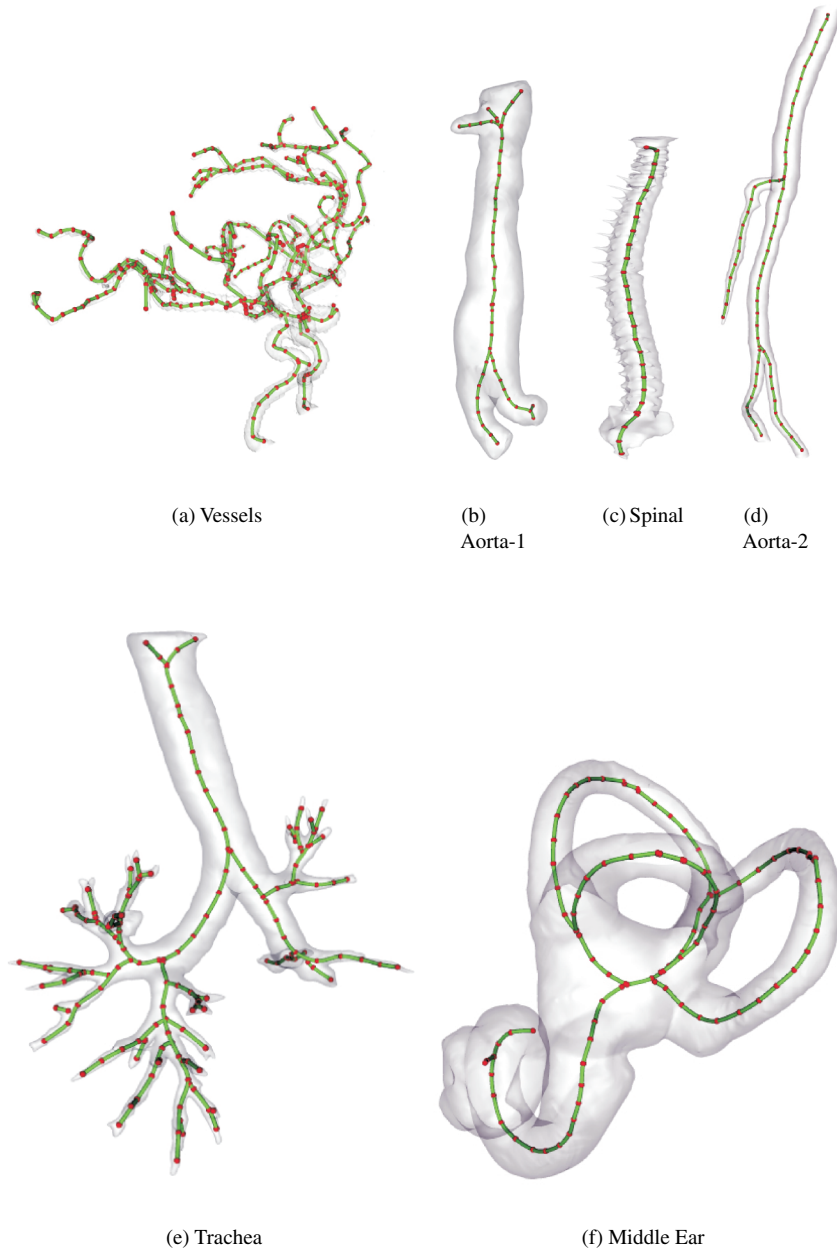


**Figure 10.** Spiral synthetic shape: (a) smooth surface (0% noise level), (b) rough surface (100% noise level), (c)  $MC$  of smooth surface, (d)  $MC$  of rough surface.

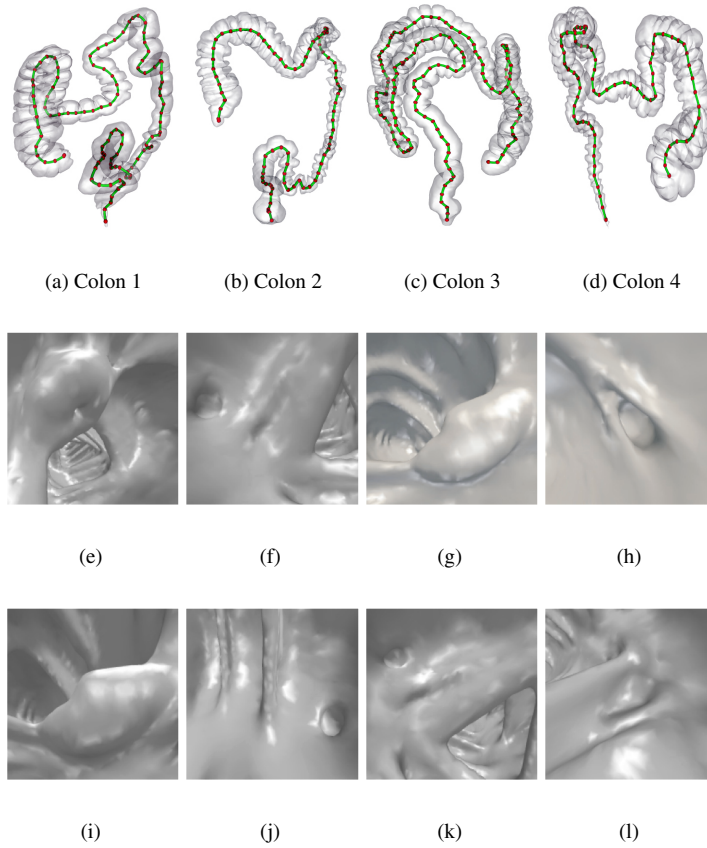


**Figure 11.** Three-connected donuts. Synthetic shape: (a) smooth surface (0% noise level), (b) rough surface (100% noise level), (c)  $\mathcal{MC}$  of smooth surface.





**Figure 12.** Computed  $\mathcal{MC}$  of clinical datasets.



**Figure 13.** Virtual colonoscopy: (a–d) computed  $\mathcal{MC}$  for different colon datasets; (e–l) polyp views captured by the virtual camera.