

Recognition and Reconstruction of a Tumor Boundary

by Collin Hood

- Hyperthermia Therapy
- Pennes' Bioheat Equation:

$$\rho^- c^- \frac{\partial T^-}{\partial t} = \nabla * (k^- \nabla T^-) - \omega_b^- \rho_b c_b (T^- - T_b) + Q_m^- + Q_r$$

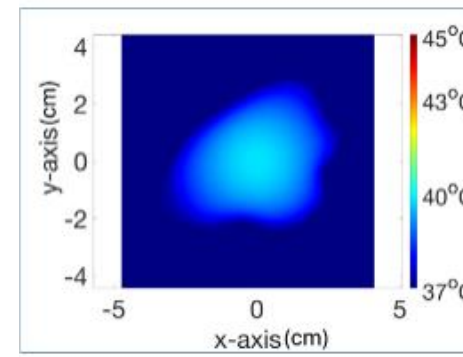
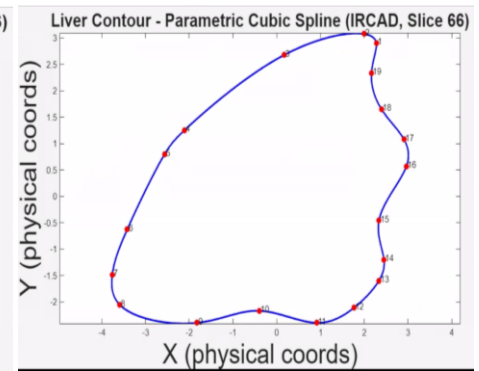
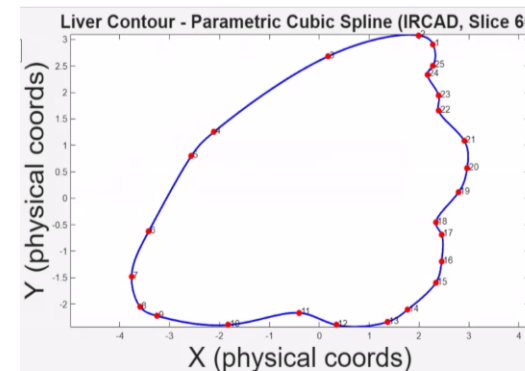
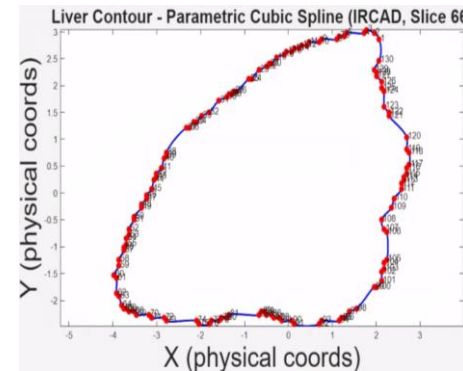
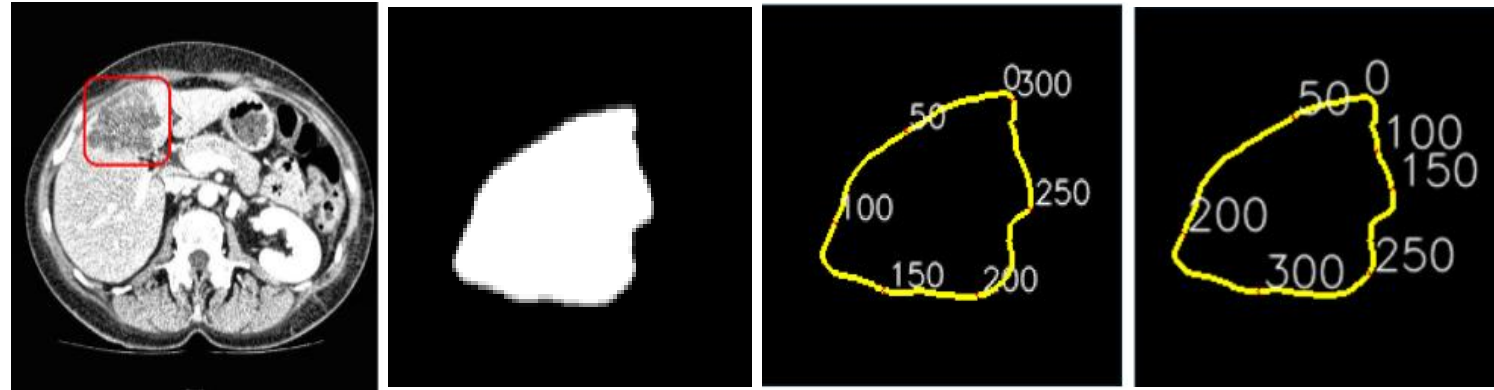
- Binary Mask Image
 - Recognition of Coordinates
 - Canny Edge Detection
 - Douglas-Peucker Algorithm

- Parametric Curve Spline:

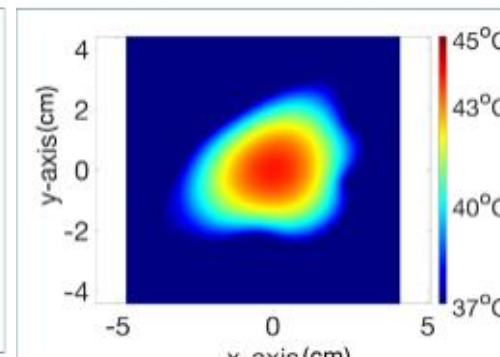
$$Ac = b$$

$$A = \begin{pmatrix} 2(\Delta\xi_{N_{cp}-1} + \Delta\xi_0) & \cdots & \Delta\xi_{N_{cp}-1} \\ \vdots & \ddots & \vdots \\ \Delta\xi_{N_{cp}-1} & \cdots & 2(\Delta\xi_{N_{cp}-2} + \Delta\xi_{-1}) \end{pmatrix}$$

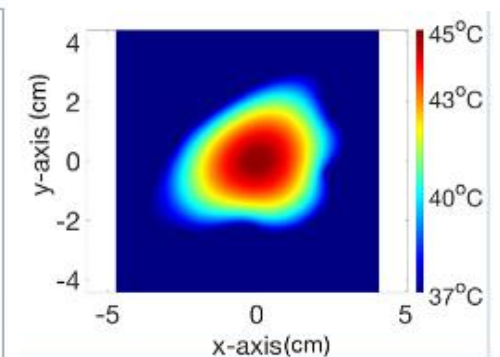
- Bioheat simulations



(a) $t = 3$ mins.



(c) $t = 12$ mins.



(e) $t = 24$ mins.