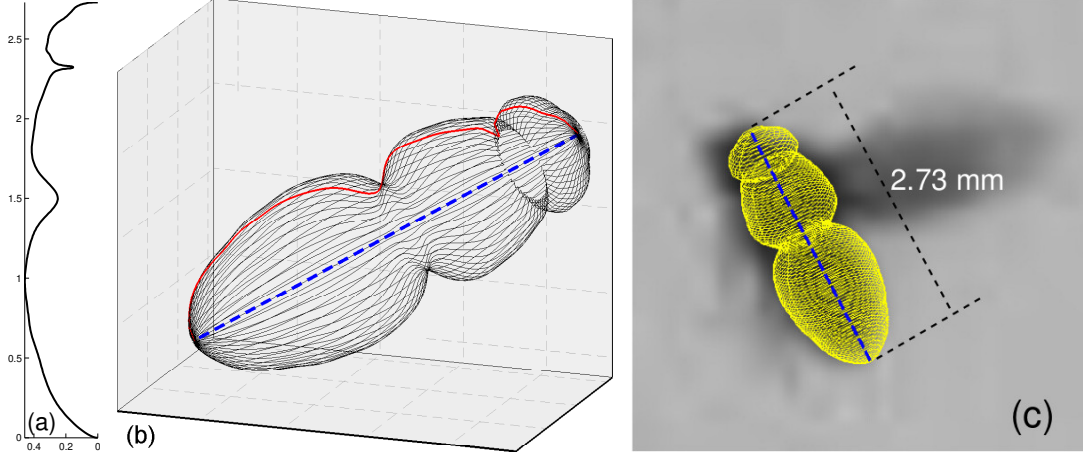We implemented a parameterized generative shape $\Upsilon^3(X_t, O_t, \tilde{l})$ in term of a profile curve revolving around the *center-axis*. The *center-axis* is a line-segment which is defined by $\{X_t(x,y,z), O_t(\theta,\phi), \tilde{l}\}$. A similar idea of generating shape model had been presented by Fontaine *et al*. [1].

Figure 1. The generative shape model of *Drosophila*. (a) The profile curve, denotes by ρ. (b) The shape Υ^3 is generated by the profile curve ρ revolving around the *center axis* in 3D space. (c) An image of a fruit fly overlaid by the shape model. The average body length is $\tilde{l} = 2.73$ mm in our experiments.

References

1. Fontaine EI, Zabala F, Dickinson MH, Burdick JW (2009) Wing and body motion during flight initiation in *Drosophila* revealed by automated visual tracking. J Exp Biol 212: 1307-1323. 1