Water layer thickness

Here we choose two different values of water layer thickness, *L*a= and *L*b= to calculate the temperature distribution. We plot the normalized temperature distribution with different *L* as shown in Fig. 2 and Fig. 3. In the calculation we keep the *T* (0,0) at constant (100 °C) and temperature decreases in *z* direction as sketch in Fig. 1. When *L* is chosen as , temperature gradient in *r* direction decreases with the increase of *z*. On the surface at z= 0.9*L*=, temperature is almost uniform. When *L* is chosen as , temperature is almost uniform on the surface at z=0.2*L*=. Thus, we can find that the temperature distribution is independent of the whole thickness of water layer *L* as long as it is larger than . It always becomes a uniform distribution on the surface around *z*=. In the water layer with z >, the temperature is uniform at the same height and decreases due to the thermal conduction heat transfer. Because of the large *Ra* and *Ma* we obtained, convection heat transfer is dominant in the droplet and the conductive water layer should be very thin. As a result, we choose *L*= as the whole thickness of the water layer. Temperature on the surface at z= is the water bulk temperature *T*b.



Figure. 1. Sketch of water layer



Figure. 2. Normalized temperature distribution with water layer thickness *L*=



Figure. 3. Normalized temperature distribution with water layer thickness *L*=