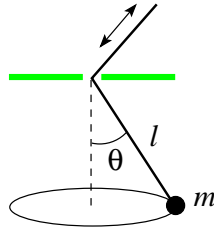## [mex226] Spherical pendulum of slowly varying length

A small mass $m$ rotates in a horizontal circle at the end of a string of length $l$ at constant angle $\theta$ from the vertical as shown. When the length $l$ is slowly varied the angle $\theta$ changes such that $f(l, \theta) = $ const. Find the function $f(l, \theta)$.



**Solution:**