Figure. The following steps show how to prognatically find model profiles: after find the two-dimensional projection  $\langle u(r,\theta,t)\alpha^*(t,m,k)\rangle_k$ , the FFT is taken in the azimuthal direction  $\theta$ . Owing to the double sideness of FFT, two lines are apparent on 2d graph (top right) and shown in three dimensional view (bottom left). These lines are the POD modal profiles and are  $C^{\infty}$  functions.

