

Movie Captions

- **Movie 1** Movie 1: The transformation of the first return map across the bistability region during superharmonic ($f_s = 2f_p$) secondary excitation is illustrated. Left panel: Black and blue curves represent 2 : 1 and 1 : 1 lock-in boundaries respectively. The bistability region is shown using blue shade. The red cross symbol shows the movement of the exciting frequency. Right panel: The corresponding first return map (blue curve) between ϕ_m modulo $4\pi - \phi_{m-1}$. Dashed line indicates $\phi_m = \phi_{m-1}$. Solid and hollow red circles represent stable and unstable fixed points respectively. The title shows the instantaneous frequency and amplitude. Other parameters are $A_p = 0.01$, $A_s = 0.05$.

- **Movie 2** Movie 2: The transformation of first return map across $A_p = A_s$ is illustrated for super (left panel: $f_s = 2f_p$) and subharmonic (right panel: $f_s = f_p/2$) secondary excitations with $A_s = 0.05$. Blue curves represent the return maps, with 4π modulo operation performed. Red curve represents the return map between $2\pi - 4\pi$, modulo operated by 2π to illustrate the change of periodicity of the map.