$$\left.\begin{array}{l} g_1^{(4)}(t_{m\pm})=0, \\ g_1^{(1)}(t_{m-})<0, \\ Dg_1^{(4)}(t_{m\pm})>0 \end{array}\right\} \text{ from } \Omega_4 \text{ to } \partial\Omega_{14}; \quad (80)$$

$$\left.\begin{array}{l} g_1^{(3)}(t_{m-})>0, \\ g_1^{(2)}(t_{m\pm})=0, \\ Dg_1^{(2)}(t_{m\pm})<0 \end{array}\right\} \text{ from } \Omega_2 \text{ to } \partial\Omega_{23}, \quad (81)$$

$$\left.\begin{array}{l} g_1^{(3)}(t_{m\pm})=0, \\ g_1^{(2)}(t_{m-})<0, \\ Dg_1^{(3)}(t_{m\pm})>0 \end{array}\right\} \text{ from } \Omega_3 \text{ to } \partial\Omega_{23}. \quad (82)$$

6 Conclusion

In this paper, passable motions and stick motions of 2-DOF friction-induced oscillator with two harmonically external excitations on a speed-varying traveling belt were investigated by using the theory of flow switchability for discontinuous dynamical systems. Different domains and boundaries for such system in the absolute space and relative space were defined according to the friction discontinuity, respectively. The analytical conditions for the passable motions and the stick motions of such 2-DOF friction-induced oscillator were presented, from which it can been seen that such oscillator has more complicated and rich dynamical behaviors. There are more theories about such oscillator to be discussed in future.

Acknowledgements: This research was supported by the National Natural Science Foundation of China(No.11471196, No.11571208).

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