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## **Simulation study on the motion process of copper foil tensioning device in vacuum undulator**

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The copper foil tensioning device is installed at both ends of the magnetic array of the vacuum undulator. One end of the copper foil is connected with the vacuum cavity flange, and the other end is connected with the end face of the magnetic array, which can move three-dimensional with the magnetic array of the undulator. Among them, compression spring, volute spring and torsion spring are the most important parts of the device. Only reasonable spring design parameters can ensure that the device moves with the magnetic array. The elasticity and torque of the three kinds of springs are constantly changing in the process of movement. In this paper, the movement process of the three kinds of springs is simulated and analyzed to ensure that the copper foil will not be stuck or broken in the movement.

### **Footnotes**

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