

The frictional resistance moment between the wobble plate and the bearing of the wobble plate:

$$M_p = f_p R_{mp} \left(\sum_{i=1}^4 F_{pi} + F_{sp} \right) / \cos \alpha$$

f_p is the coefficient of friction between the wobble plate and the bearing of the wobble plate, R_{mp} is the average radius of the friction surface between the wobble plate and the bearing of the wobble plate.

The frictional resistance moment between the drive plate and the bearing of the drive plate:

$$M_r = f_r R_{mr} \left(\sum_{i=1}^4 F_{pi} + F_{sp} \right)$$

f_r is the coefficient of friction between the drive plate and the bearing of the drive plate, R_{mr} is the average radius of the friction surface between the drive plate and the bearing of the drive plate.

3) Total resistance moment

The total resistance moment of the compressor is equal to the total frictional resistance moment and the resistance moment of all the cylinders. The total resistance moment is shown in Figure 13.

$$M = \sum_{i=1}^4 M_i + M_r$$

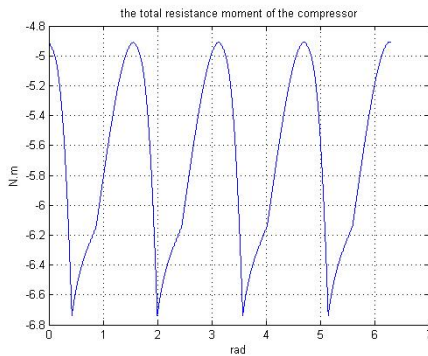


Figure13. The total resistance moment

The size and direction of the piston force is changing all the time because the cylinders are in different position. Some of the piston forces make the connecting rod press the wobble plate, the others make the connecting rod divorce from wobble plate, which makes the work resistance moment of each cylinder changing all the time. The friction resistance moment will change with the drive plate rotating, but only a little change.

V. CONCLUSION

After the dynamic analysis and calculation of all the above, the following conclusions can be drawn:

(1)The four pistons of the wobble plate compressor move in a cosine curve and in the same trip when the drive shaft is rotating uniformly, and they are followed by a difference of

0.5π phase angle. This is also the basis for calculating the piston force and the resistance moment. The variation law of the others can be drawn through the piston 1 changes.

(2)The reciprocating inertia force may have been the vibration source of machine. As can be seen from the graph, it is a cosine curve, but the amplitude is small. This type is 4 cylinder structure and the cylinders are distributed uniformly, so that the reciprocating inertia force can almost achieve a balance. So we can make use of the multi-column cylinder structure and the method of trimming the mass of the drive shaft or the swash plate to balance.

(3) The total resistance moment of the wobble plate compressor has been always changing frequently with the drive plate rotating, which is determined by the gas force. That is to say, if the outlet pressure desired is greater, the resistance moment will be greater. The accurate numerical value can be calculated by the outlet pressure designed. Through the variation law of the resistance moment, we can draw the average resistance moment in a rotation period, and we can further get the shaft power of the wobble plate compressor, which will make the drive motor selected easily.

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