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Effects of index angle on flow ripple of a tandem axial piston pump

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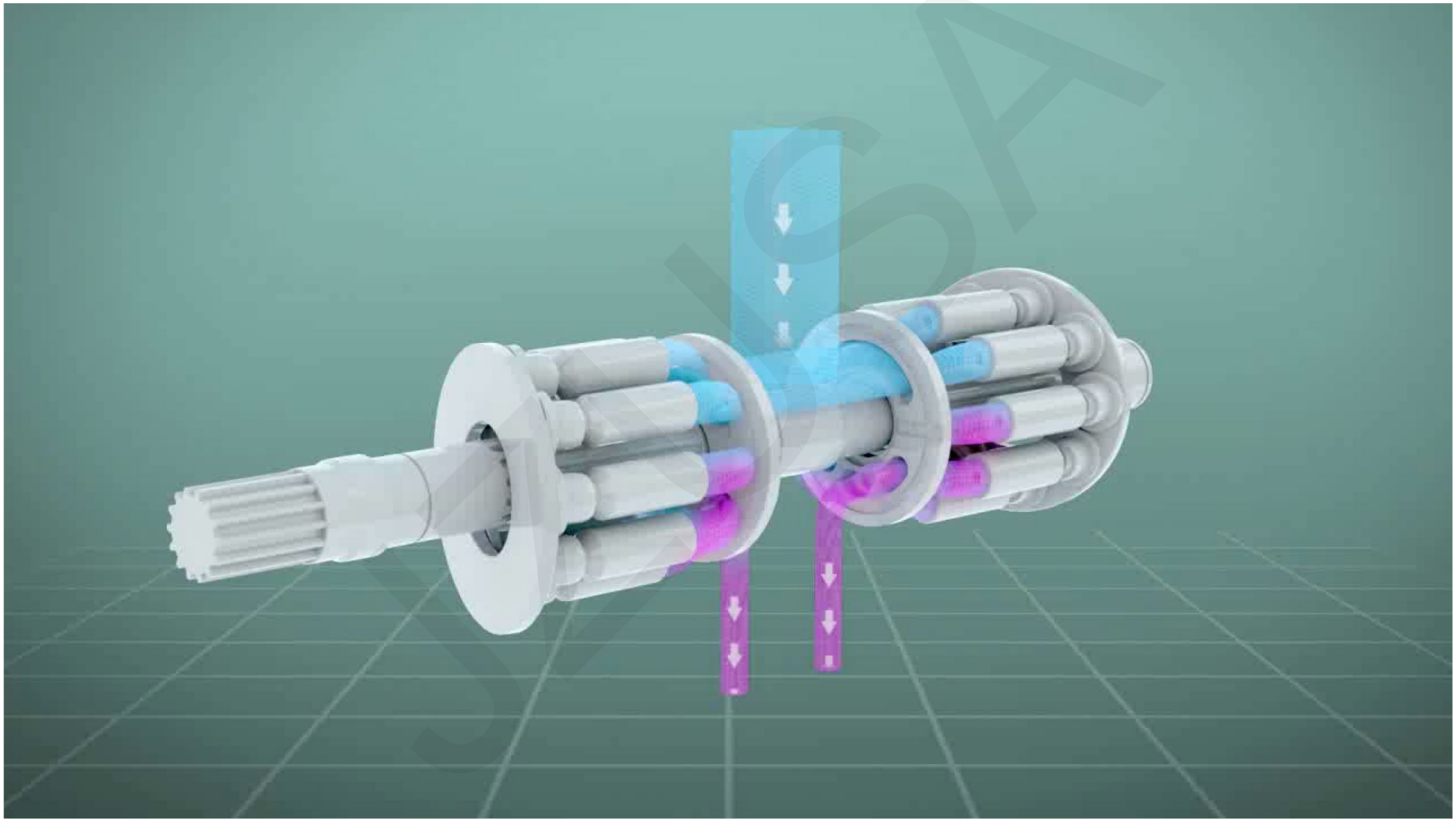
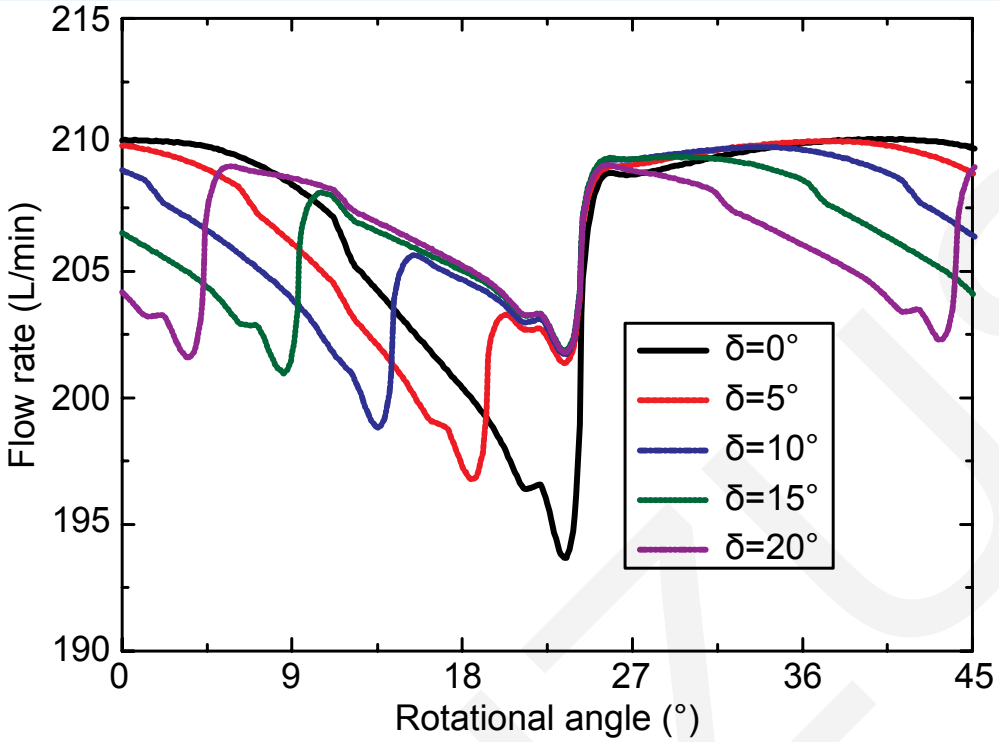
Description



Best index angle

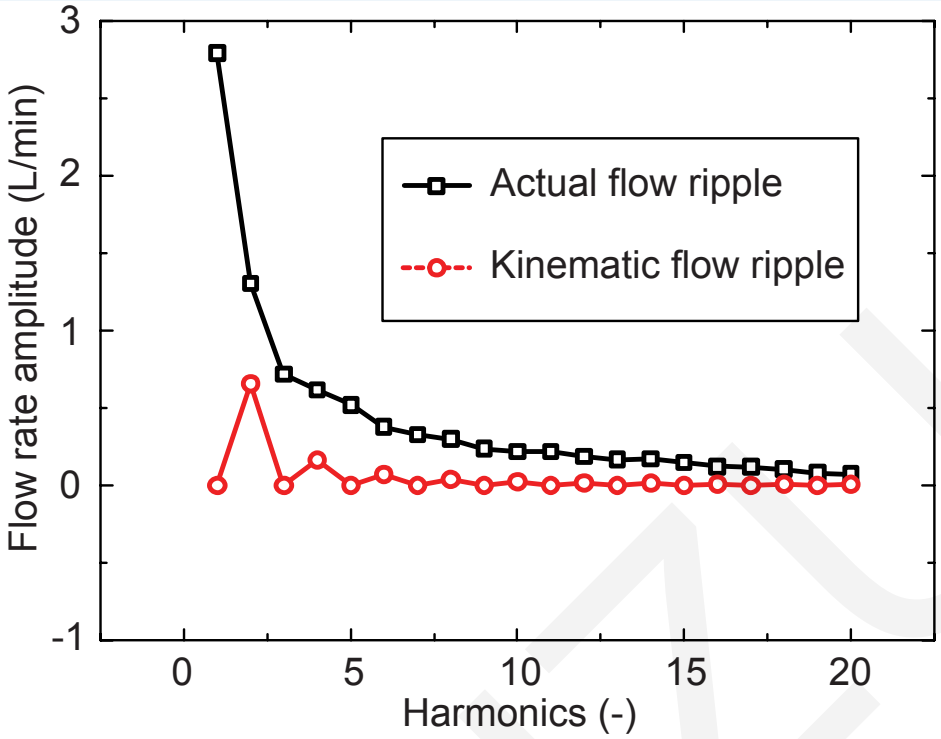


Variations in flow ripple

- Time domain;
- One period;
- Amplitude.

- The best index-angle is determined;
- Flow ripple decreases as the index angle increases.

The reasons

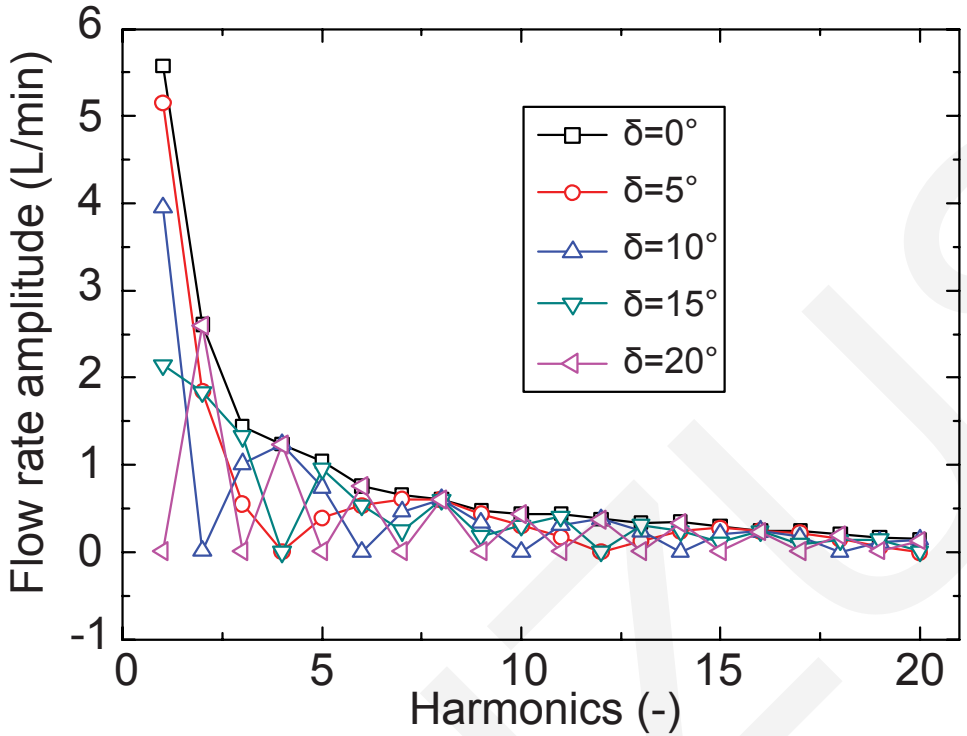


Flow ripple comparisons

- Kinematic component;
- Dynamic component;
- Actual component.

- Dynamic component is larger than kinematic one;
- Actual component is rich in harmonics.

The reasons

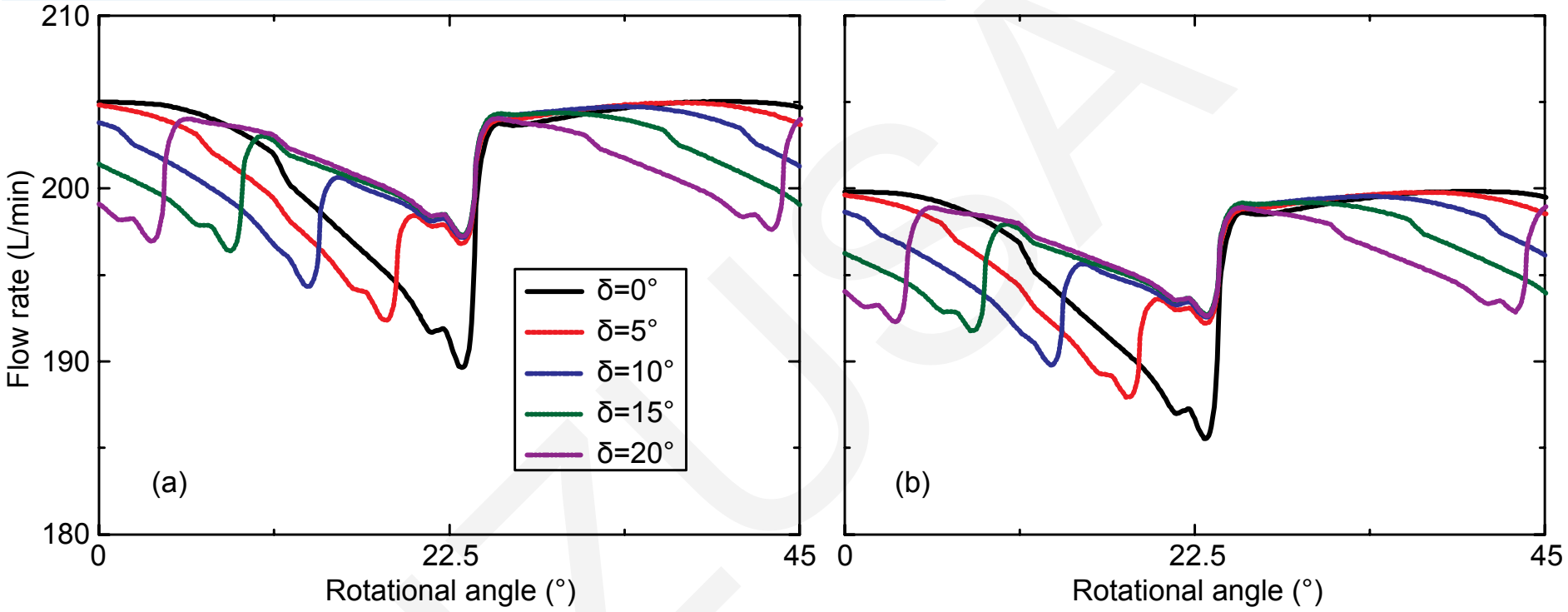


Variations in flow ripple

- Frequency domain;
- Twenty harmonics;
- Phase difference.

- Odd harmonics can be cancelled out;
- Reduce the flow ripple components.

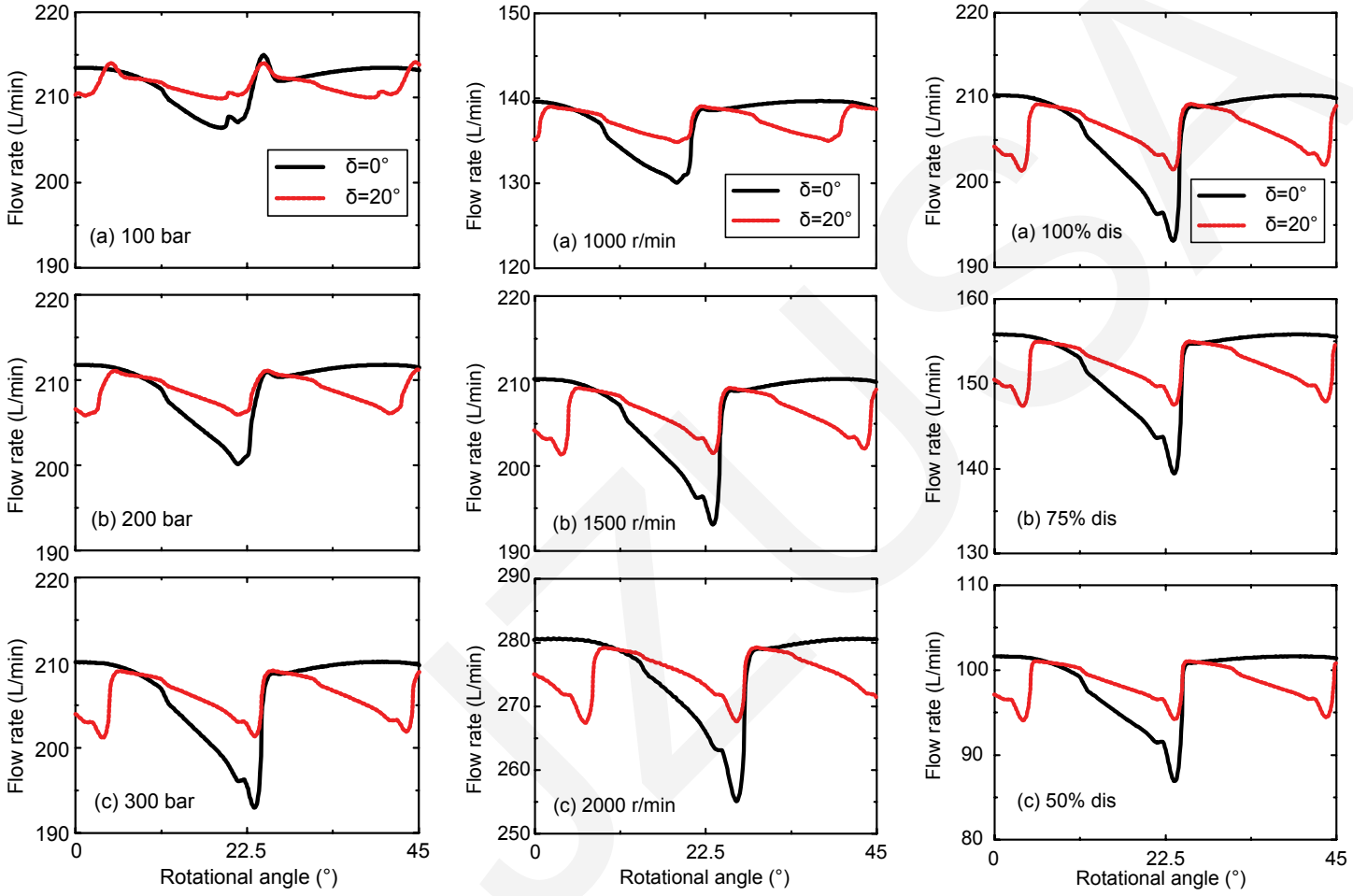
Sensitivity



Variations in flow ripple when displacements of the two rotating group are merely different

- Insensitive to displacement difference.

Sensitivity



Pressure levels | Revolution speeds | Displacement angles

Lower flow ripple at a wide range of working conditions.

Summary and outlook

◆ The flow ripple of a tandem axial piston pump was investigated;
◆ The effects of index angle on the flow ripple is investigated;
◆ The best index angle is 20° to reduce the flow ripple;
◆ The reason is identified.

◆ Evaluation of airborne noise;
◆ Experimental investigation.

Earlier publications

Ye, S.G., Xu, B., Zhang, J.H., 2014. Investigation into the effects of index angle on fluidborne noise and structureborne noise of a tandem axial piston pump. 8th FPNI Ph.D Symposium on Fluid Power, Lappeenranta, Finland, p.1-6. [doi:10.1115/FPNI2014-7815]

◆ A hybrid LP/FE model was developed to investigate the airborne noise;

◆ Fluid-borne noise sources decreases (the reason is unclear), whereas strure-borne noise sources increases.