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# ABSTRACT

The possible negative or positive impact of annular seal on rotordynamics of compressors and steam turbines is discussed. The nature of destabilizing forces that can be developed by see-through and interlocking labyrinths is discussed.

# INTRODUCTION

The first task of an annular seal is the restriction of leakage flowrate between a rotating shaft and a stationary housing. As it turns out, annular gas seals can also have a significant impact on dynamic characteristics of compressors and turbines.

# MAIN HEADINGS

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High-pressure compressors can use either the flow-through or the back-to-back designs of Figure 1. In the through-flow design, gas enters from the left and proceeds directly from impeller to impeller.

The most important seal parameters include the following:

* Diameter
* Length
* Clearance
* Tooth geometry
	+ Pitch
	+ Height

An equation is described by Equation (1)

 $\vec{F}=\frac{m∙\vec{a}}{g\_{c}}$$F=\frac{m∙a}{g\_{c}}$ (1)

where;

$\vec{F}= $force vector, $lb\_{f}$ $\left(N\right)$

$m=$ mass, $lb\_{m}$ $\left(kg\right)$

$\vec{a}= $acceleration vector, ${in}/{s^{2}}$ $\left({m}/{s^{2}}\right)$

$g\_{c}=$ gravitational conversion factor, $386.09∙\frac{lb\_{m}∙in}{lb\_{f}∙s^{2}}$ $\left(1∙\frac{kg∙m}{N∙s^{2}}\right)$

# CONCLUSIONS

The initial (narrow) view of labyrinth seals as bad actors that caused rotordynamic instability problems has broadened today, to the view that annular seals can be used to remarkably improve rotordynamic response and stability characteristics of turbomachinery.

# NOMENCLATURE

*A* = Area (L2)

*r* = Radius (L)

*γ* = Area ratio (-)

HPOTP = High pressure oxygen turbopump

SSME = Space shuttle main engine

TOR = Teeth on rotor

# APPENDIX A

Appendix A begins here. Appendix A begins here. Appendix A begins here. Appendix A begins here.

# REFERENCES

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