ÉCOLE POLYTECHNIQUE MONTRÉAL

VIBRATION AND FRETTING-WEAR DAMAGE IN STEAM GENERATORS

by

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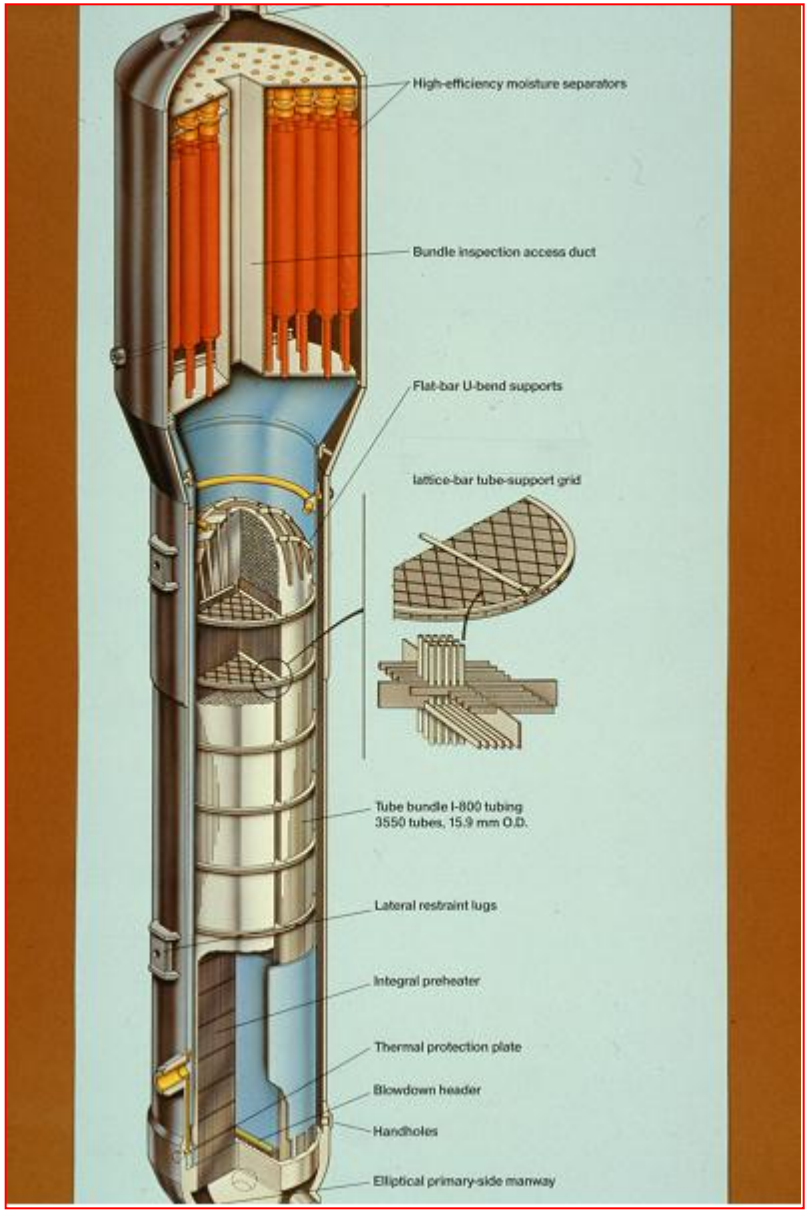
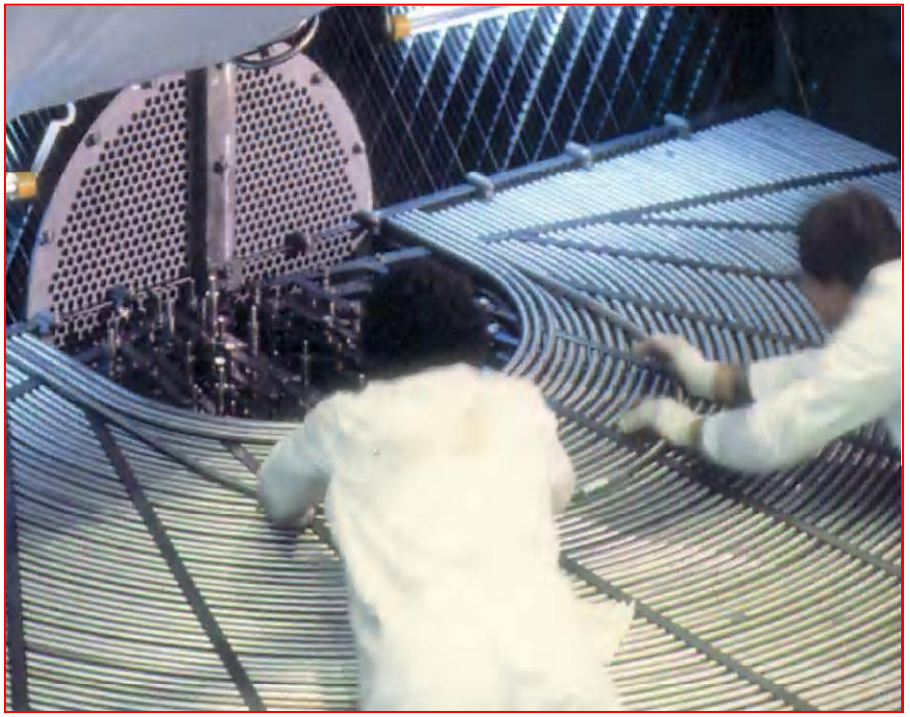
NRC Meeting on
Steam Generator Tube Degradation:
NRC Washington DC
February 7th, 2013

AECL / EACL

Recirculating Type Nuclear Steam Generator





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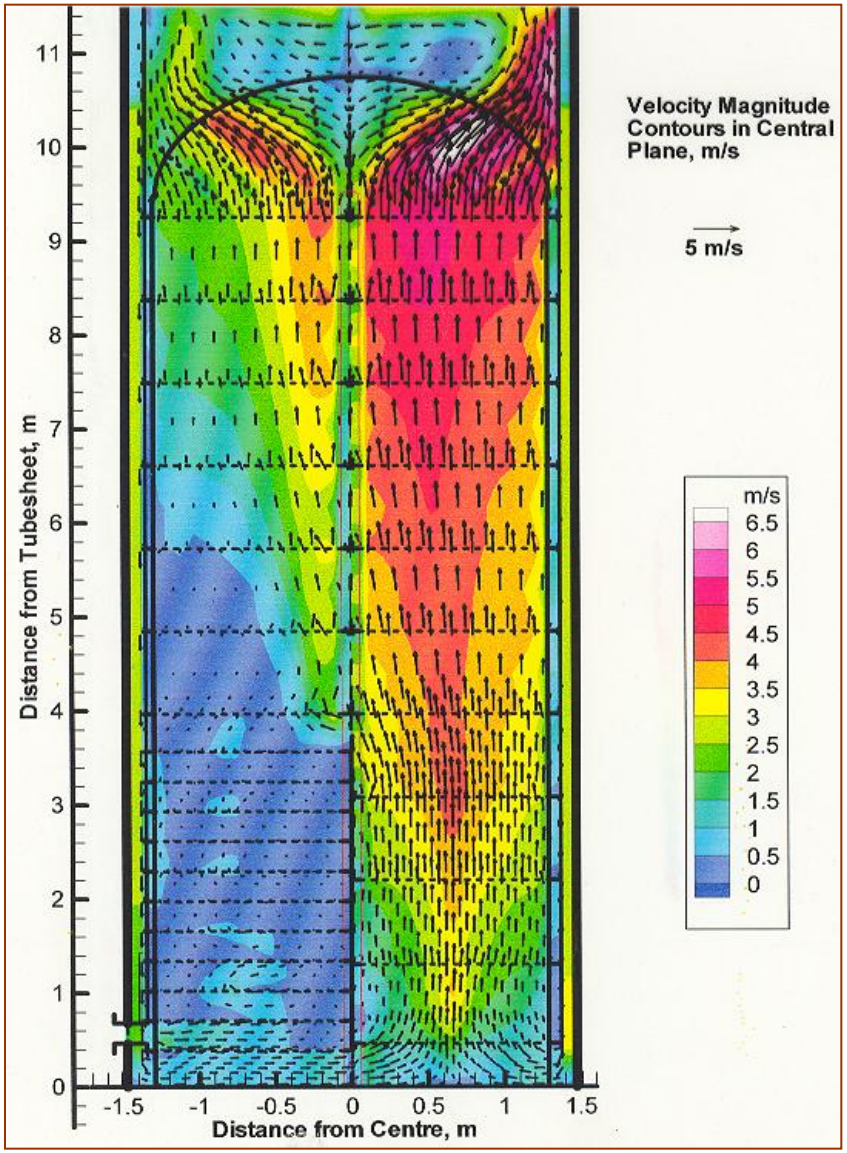
Flow Velocity Vectors in the Central Plane of a Typical Steam Generator U-bend Region



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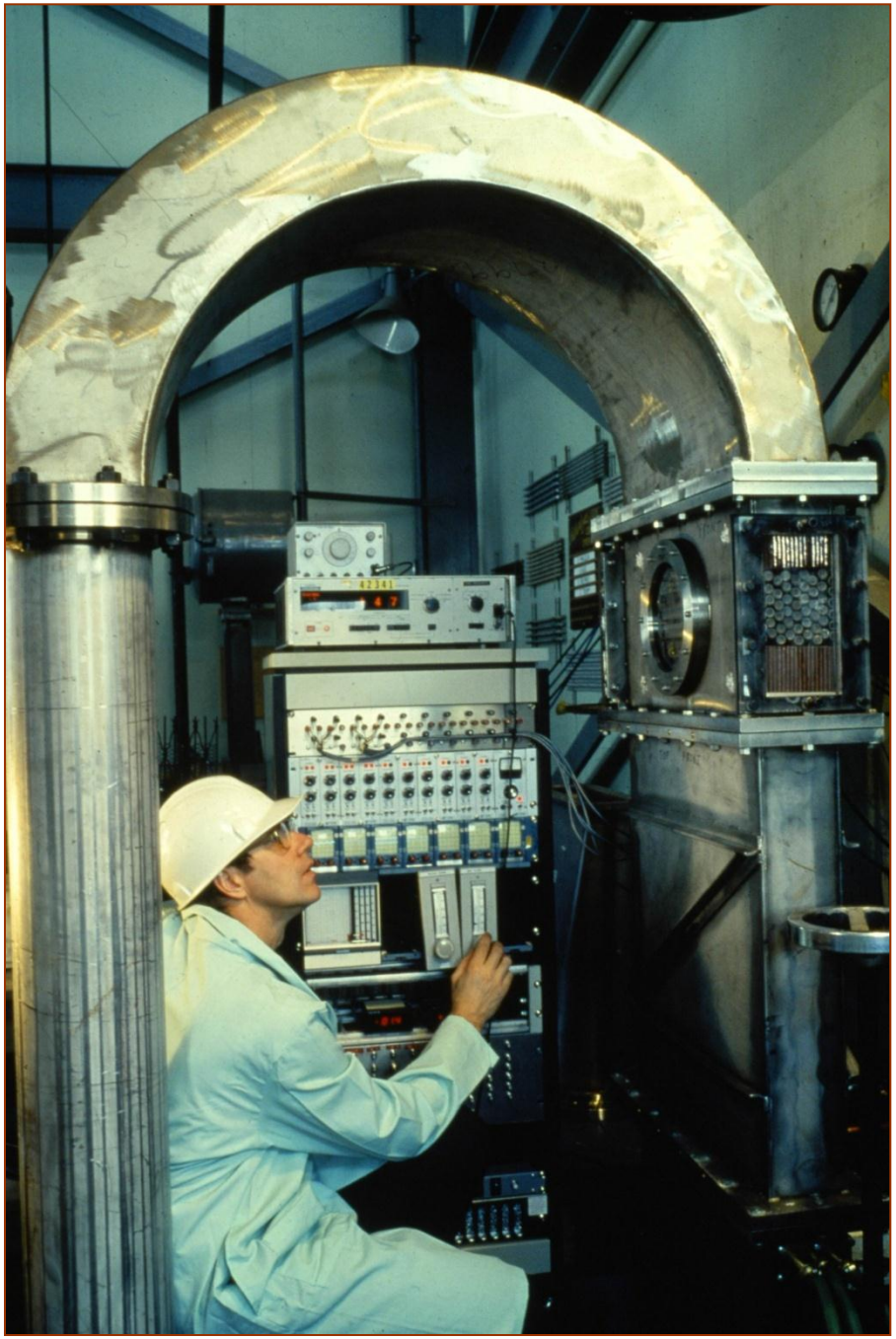
Test Section



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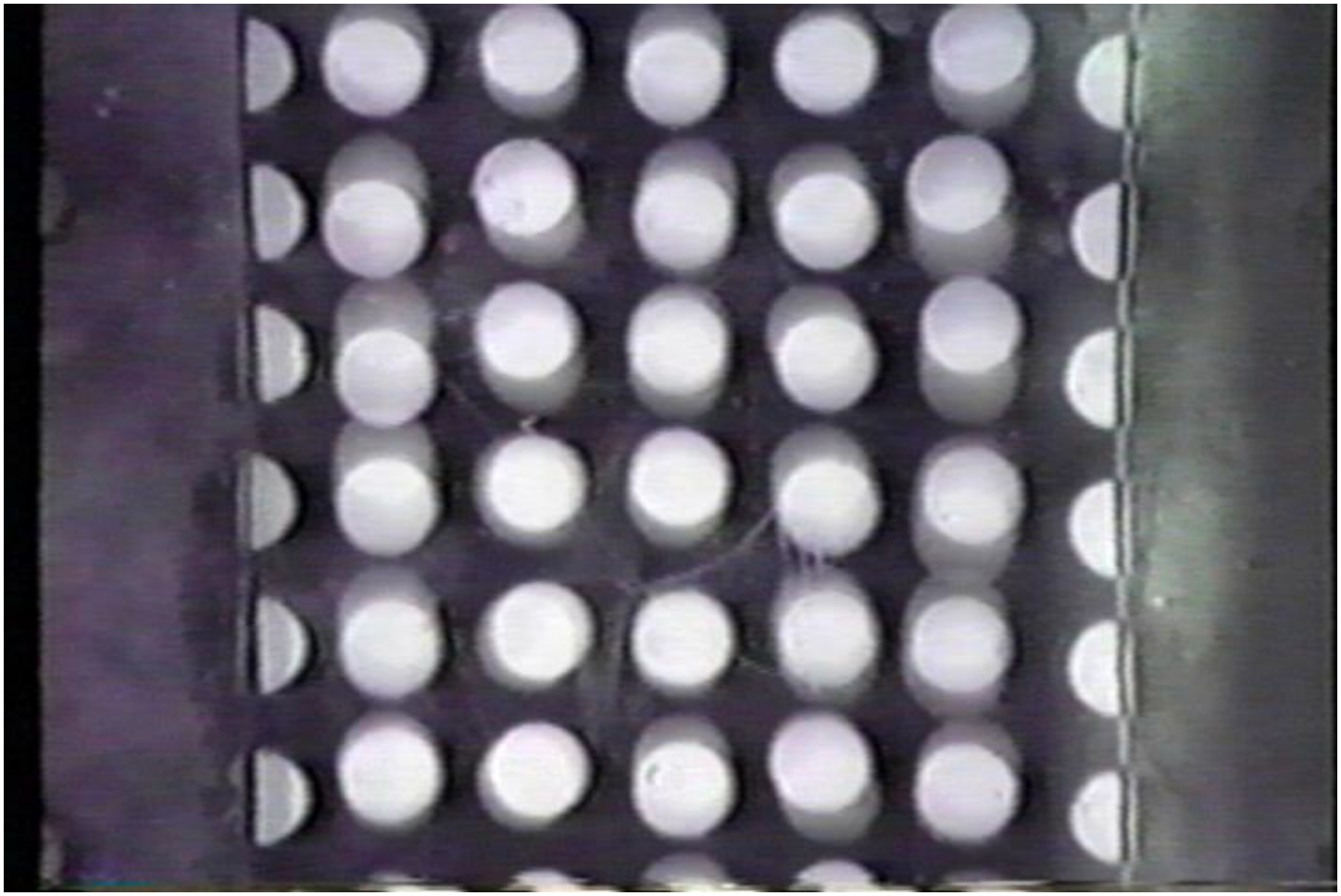
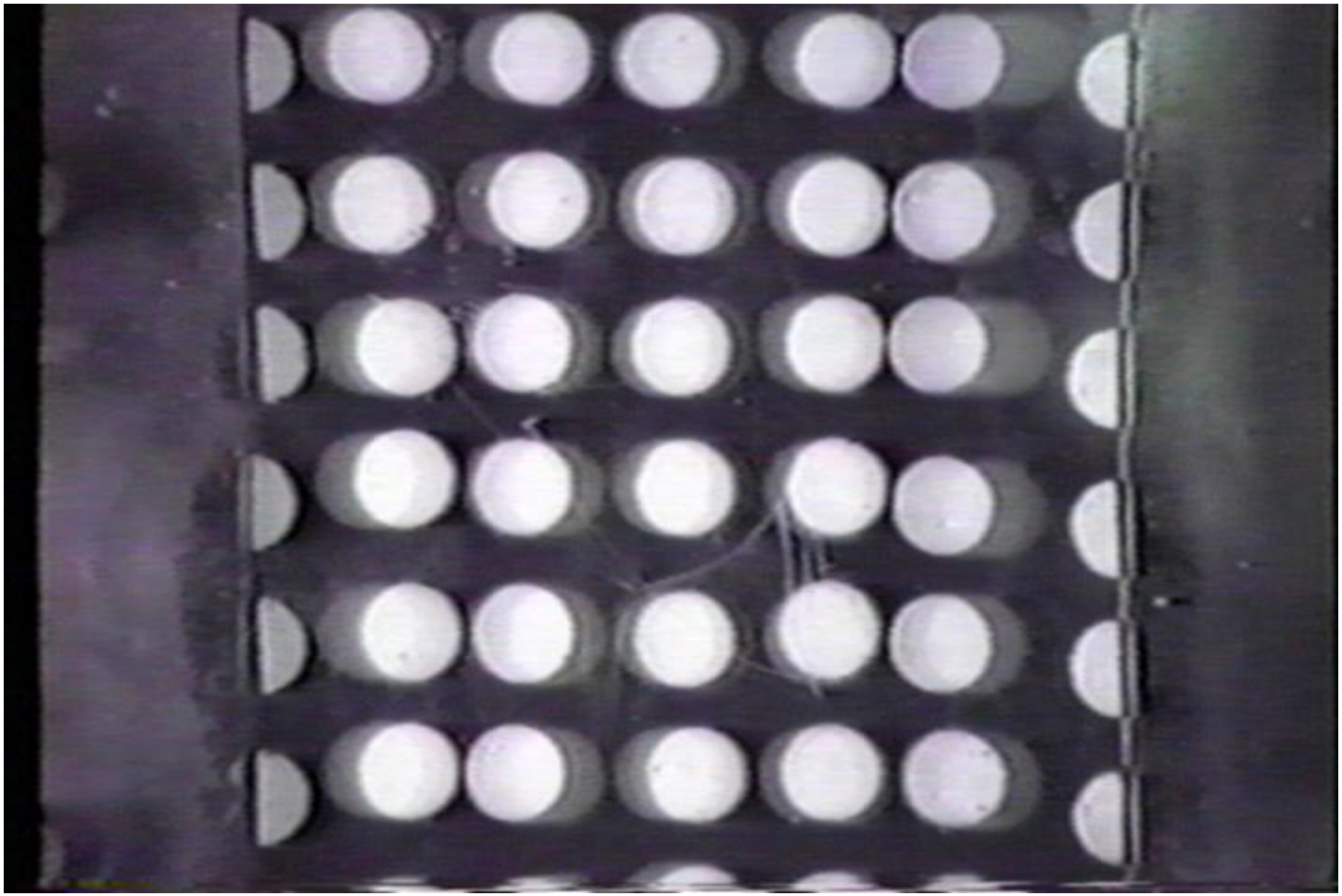
Water Flow



Water Flow



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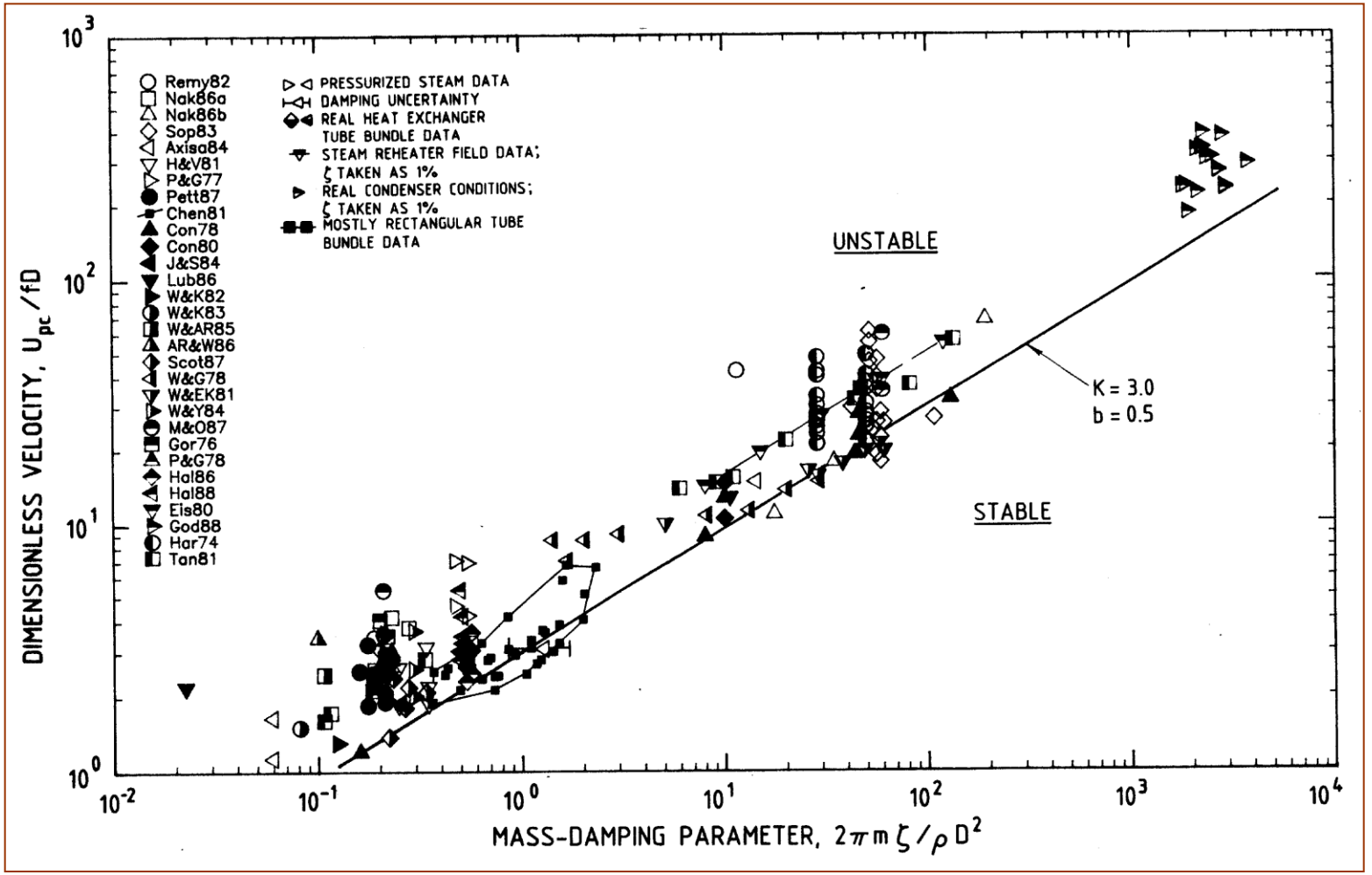
Summary of Fluidelastic Instability Data: Recommended Design Guidelines



Fluidelastic Instability in Two-Phase Cross Flow In-plane VS Out-of-plane

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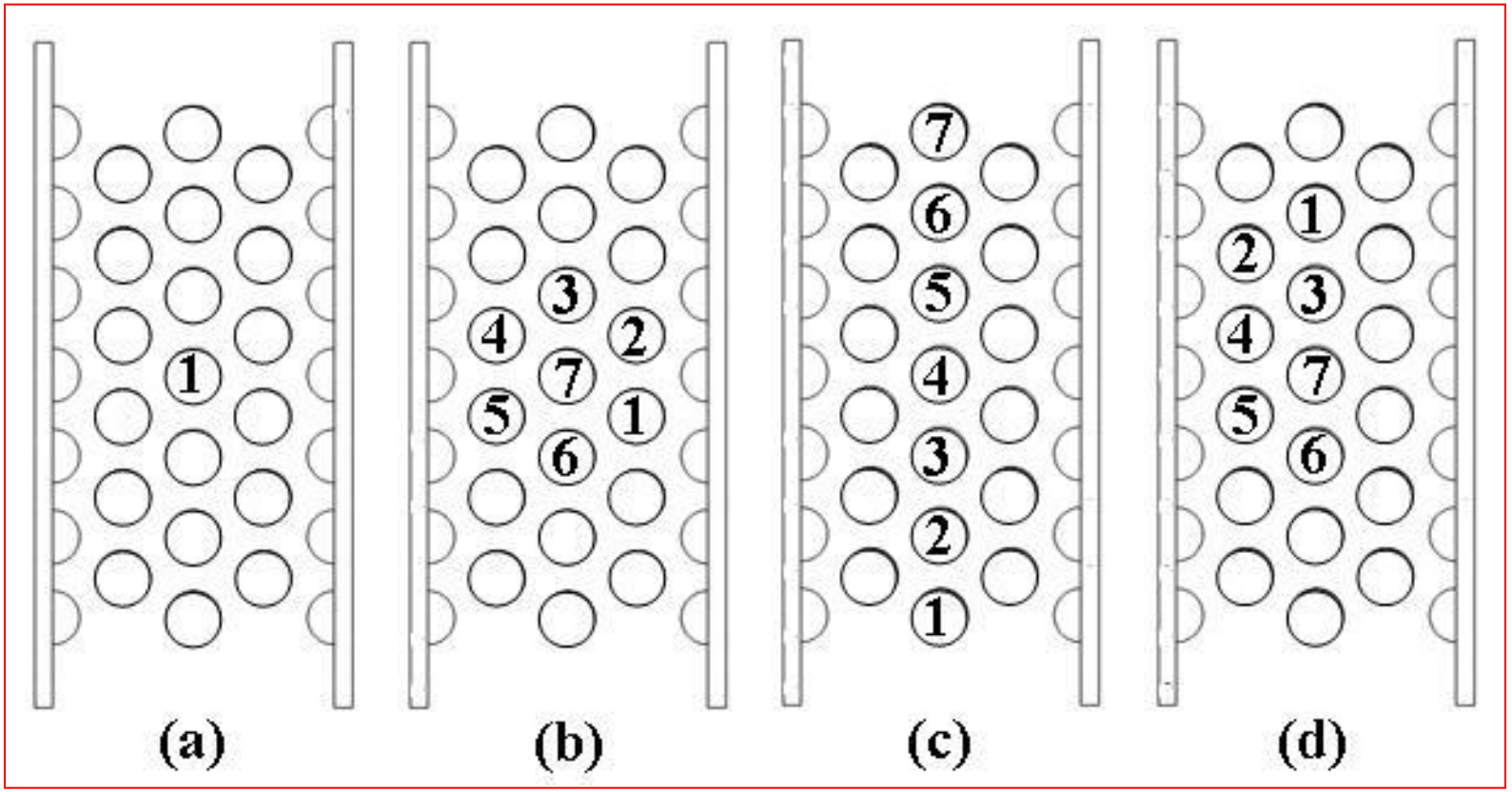
Configurations of Flexible Tubes



Single flexible tube

Central cluster

Single flexible column

Two-partially flexible columns

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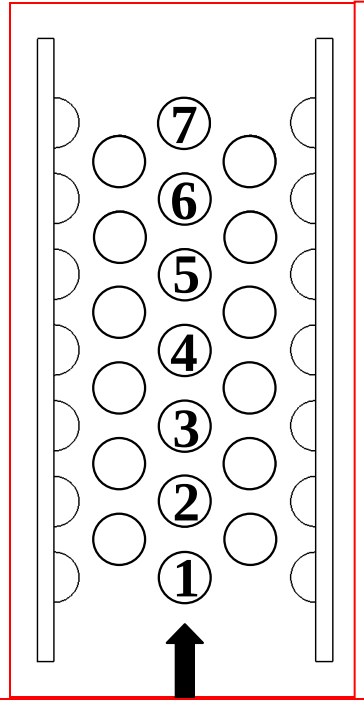
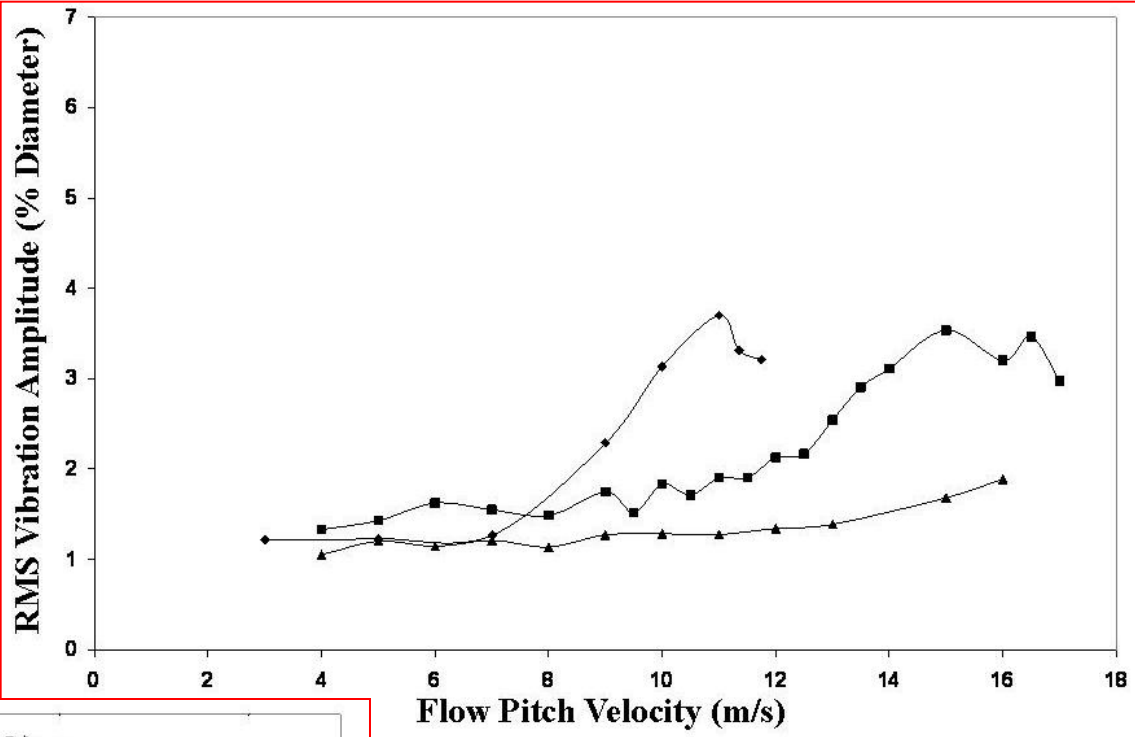
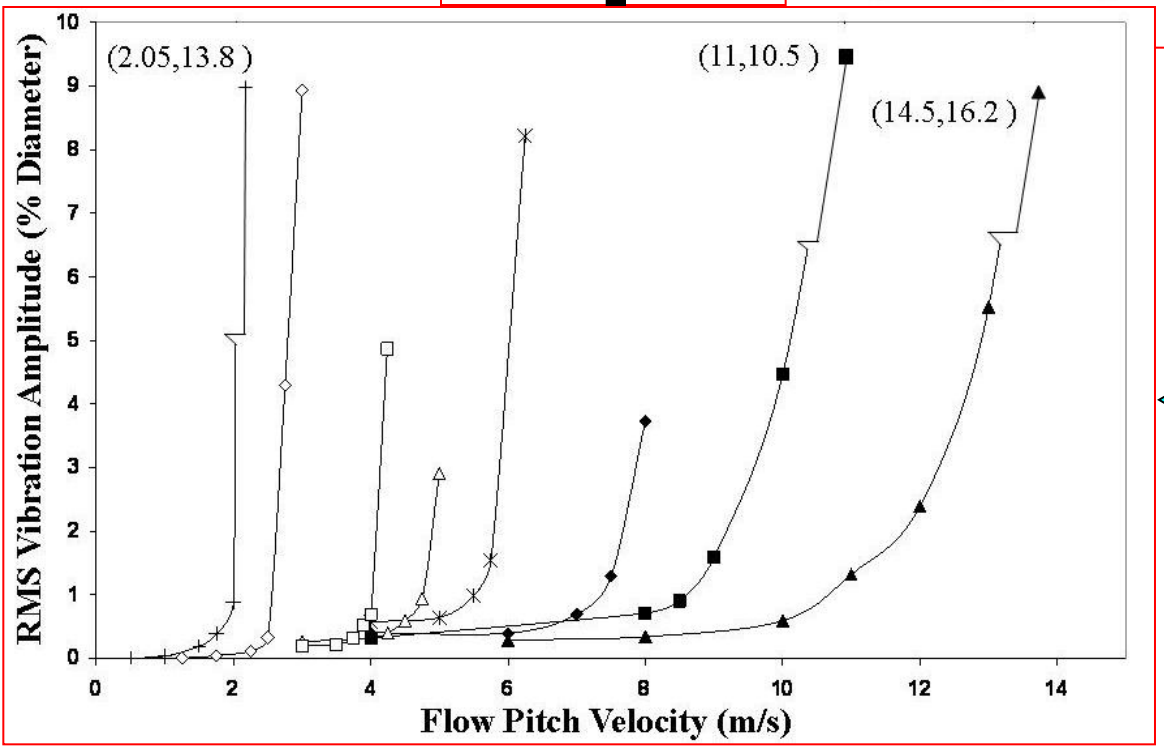
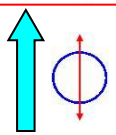
Single Column

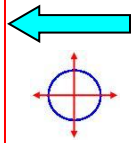








In-plane flexibility
(f_n=14 Hz)



Axisymetric flexibility
(f_n=30 Hz)

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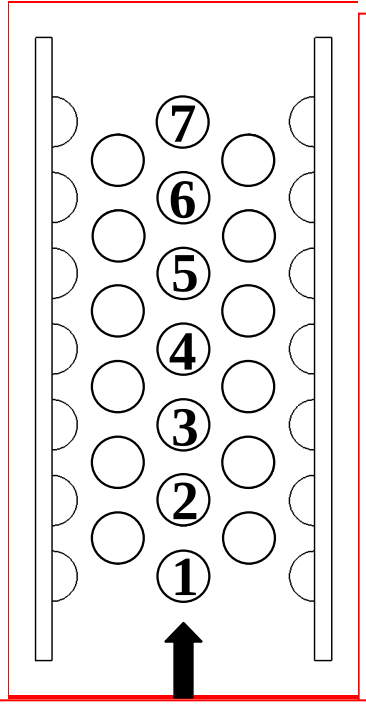
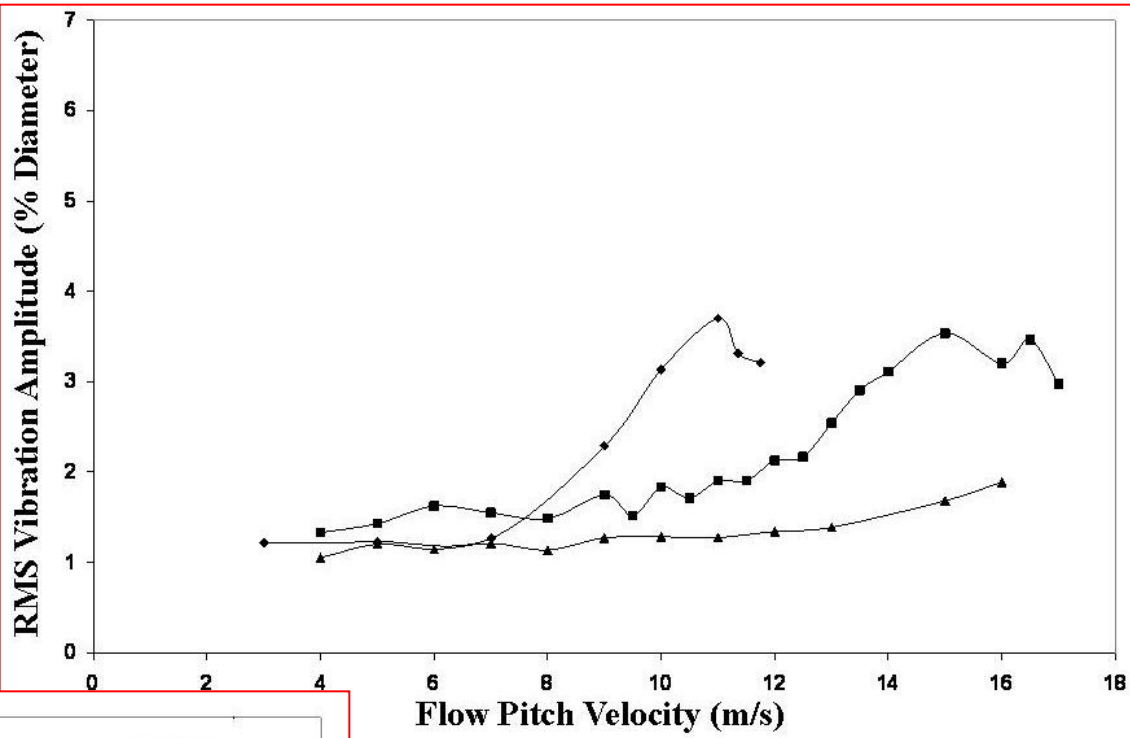
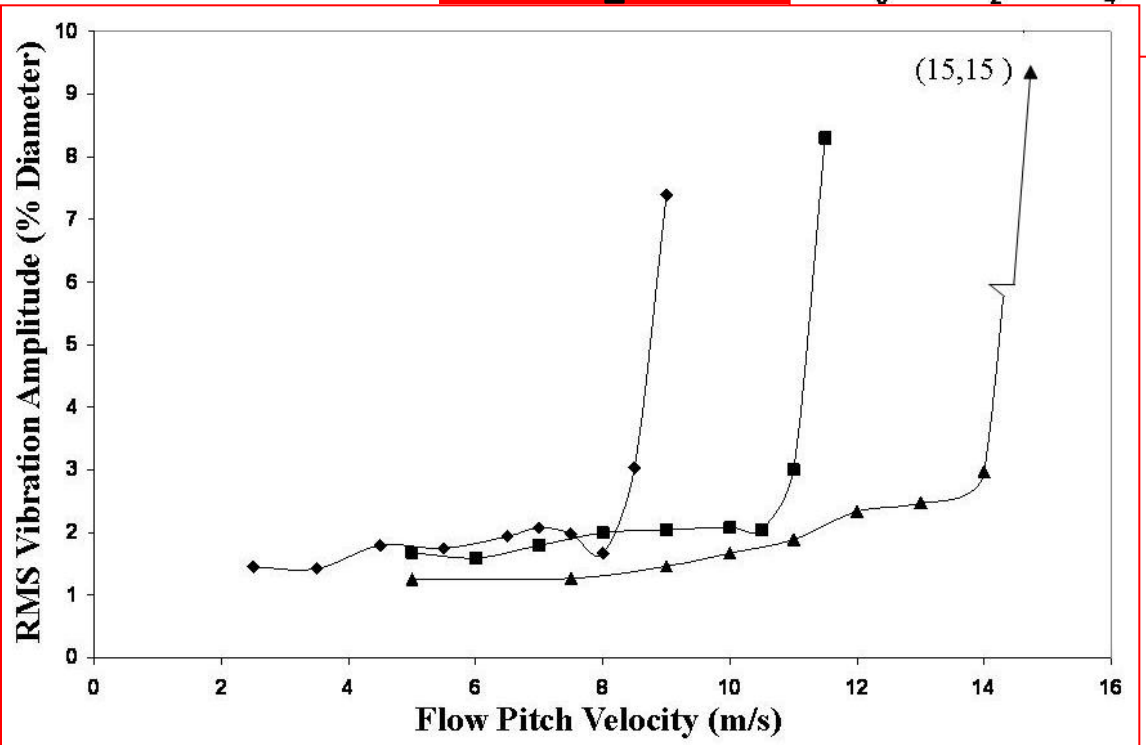
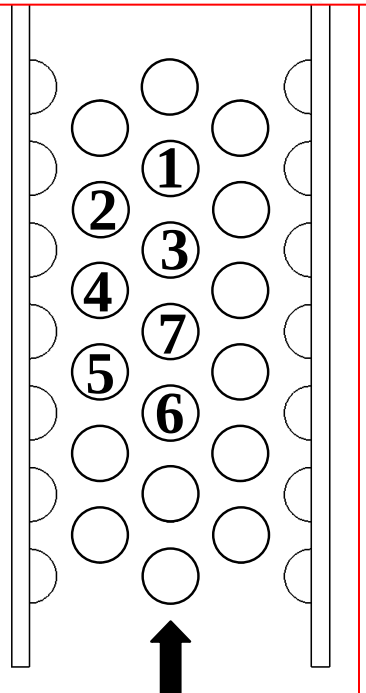
In-Plane Flexibility

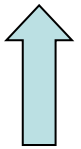
(f_n=14 Hz)









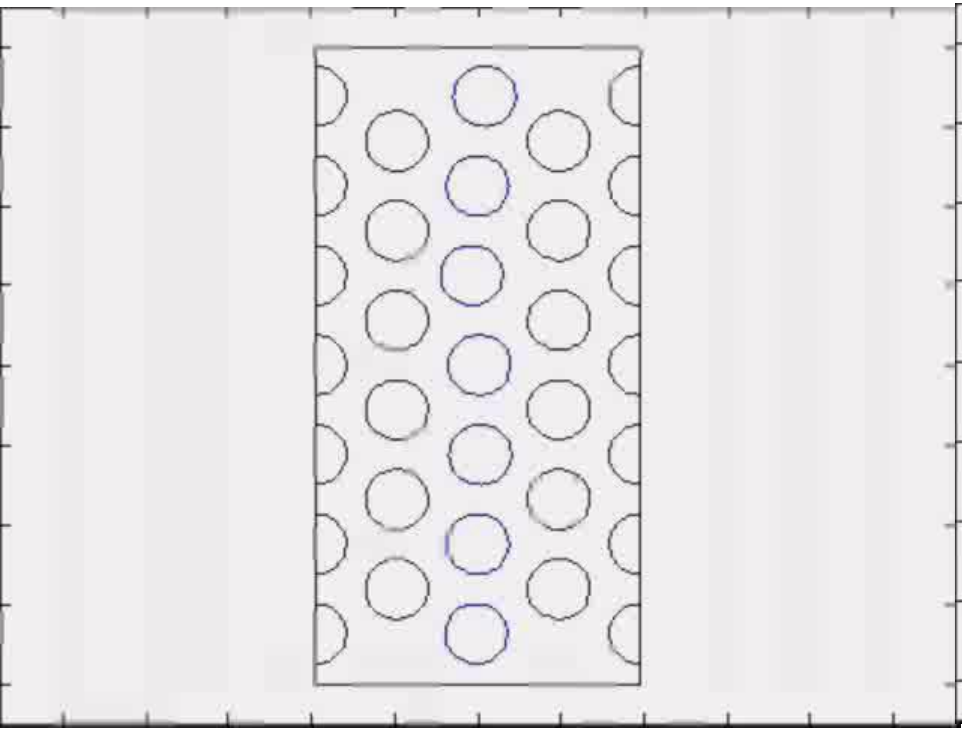


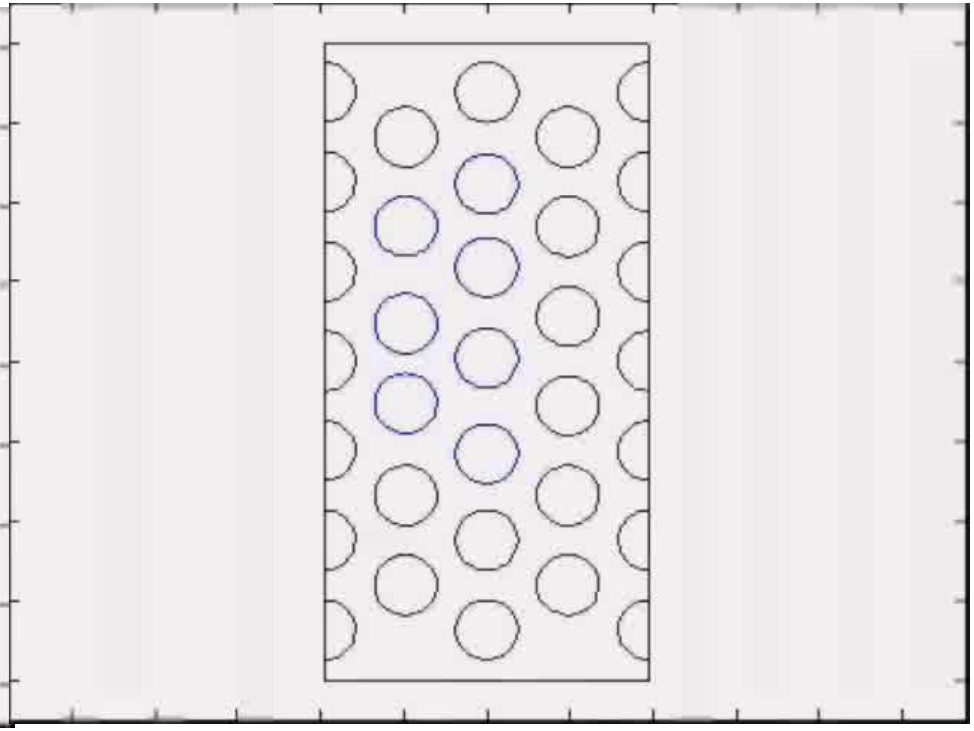
Single column

Double columns

Axisymetric Flexibility for One Flexible Column

In-Plane Flexibility for Two Flexible Columns





Instability mode for β=80%

Instability mode for β=90%

Instability Map