

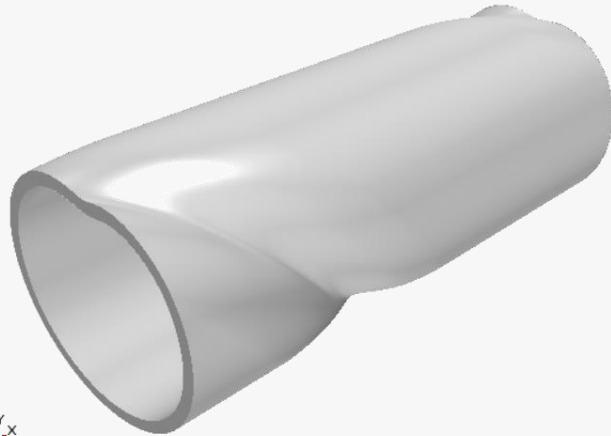


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CENTER for  
INNOVATION,  
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RESEARCH

# Heat transfer enhancement with corrugated tubes

## Numerical and Experimental work



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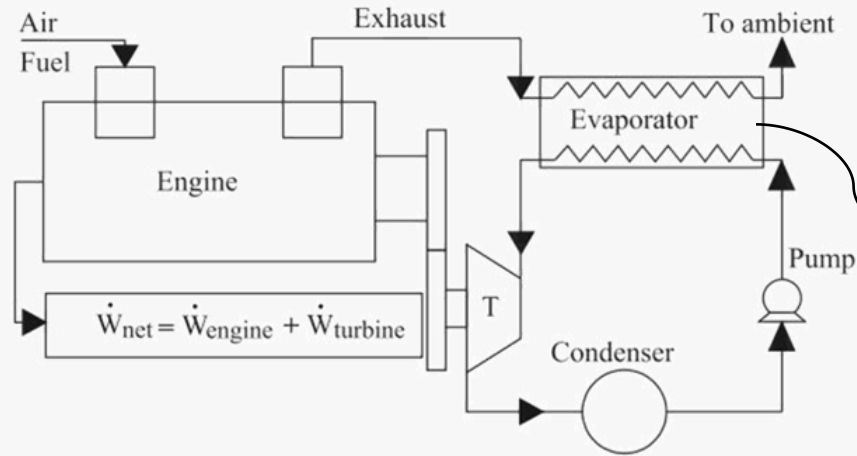
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Prof. Miguel Mendes



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# Motivation and Context



Exhaust Heat Recovery system T. Wang, 2001

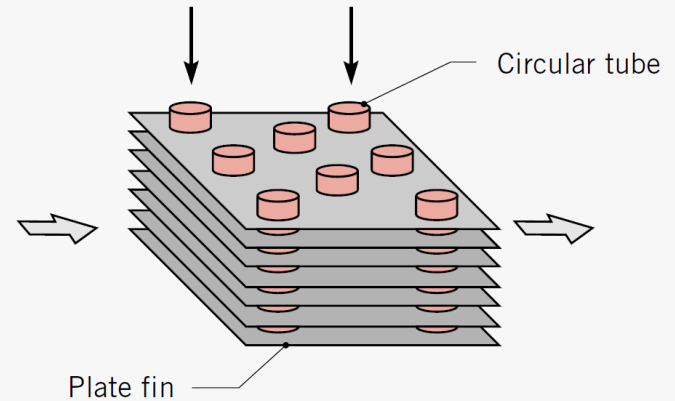
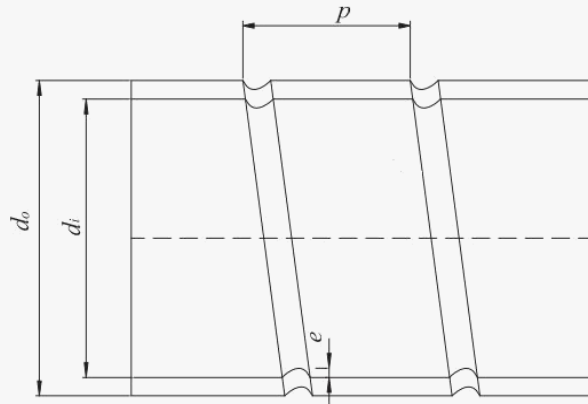


Plate fin compact heat exchanger Incropera, 2007

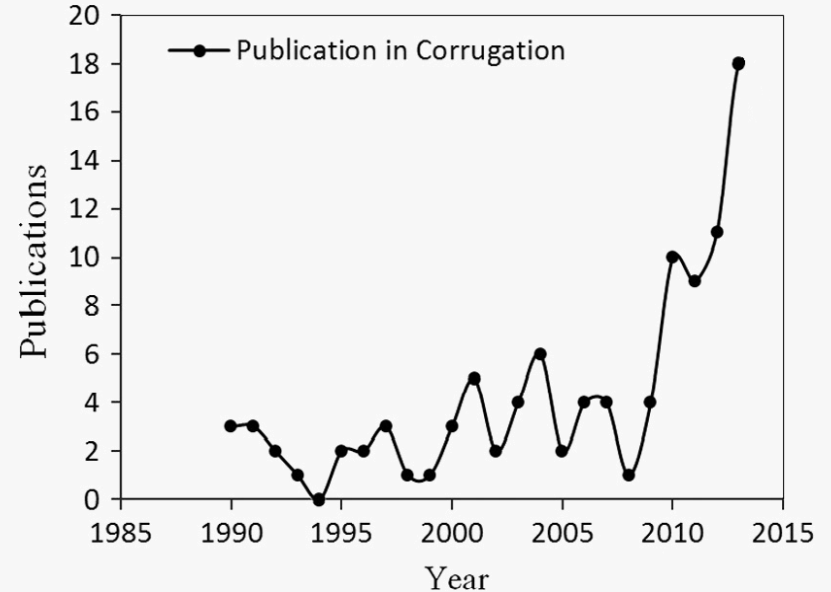
# Motivation and Context

Review works show a **heat enhancement** obtained when **swirl** is induced in the flow either by active enhancement techniques, where external power is required, and by **passive methods**, that resort to causing **secondary flows via geometry changes** or extended surfaces



Corrugation geometry characteristic dimensions

M. Sheikholeslami, 2015



Evolution in corrugation publications

Z. S. Kareem, 2015

# Conclusions

- The corrugated geometry leads to higher heat transfer accompanied by increase pressure losses due to the induced swirl in the flow
- The thermal performance factor, key in the design of heat exchangers, presents the corrugated geometry as more efficient solution, mainly in the low turbulent regime
- Experimental work clearly defines the transition region and the numerical work allows the identification of thermal hotspots

