

# Multidimensional turbine cavitation characteristics

<i>Name</i>	<i>Independent variables</i>	<i>Meaning</i>	<i>Definition</i>
Detailed cavitation characteristic	Runner blade number, $b$ Guide vane number, $v$ Operation parameters, $P$	Intensity of the component of cavitation on $b$ which is influenced by $v$ , as developed while the turbine is being operated in $P$	Raw input data
Runner cavitation characteristic	Runner blade number, $b$ Operation parameters, $P$	Intensity of the cavitation on $b$ as developed while the turbine is being operated in $P$	Intensity of the detailed characteristic summed over all $v$ 's
Wicket-gate cavitation characteristic	Guide vane number, $v$ Operation parameters, $P$	Intensity of the component of cavitation on the runner which is influenced by $v$ , as developed while the turbine is being operated in $P$	Intensity of the detailed characteristic being summed over all $b$ 's
Global cavitation characteristic	Operation parameters, $P$	Total cavitation intensity in the turbine while it is being operated in $P$	Intensity of the detailed characteristic summed over all $b$ 's and all $v$ 's

***With respect to cavitation mechanisms\*, each of the characteristics can be defined:***

- for the total cavitation in the turbine,
- for each cavitation mechanism separately,
- for the group of the erosive mechanisms.

## ***Calibration***

- relative, with an arbitrary reference
- absolute, in kilograms of metal mass lost in a specified time interval (e.g. 10,000 hours) while the turbine is being operated within a specified  $P$ -range (e.g. in a 1 MW interval of the turbine power at a constant head and a constant tail water level).

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\* Cavitation mechanisms are different types of cavitation or the same type appearing in different locations in the turbine.

## **Illustrations follow....**

Vertical Francis turbine

48 MW

20 guide vanes

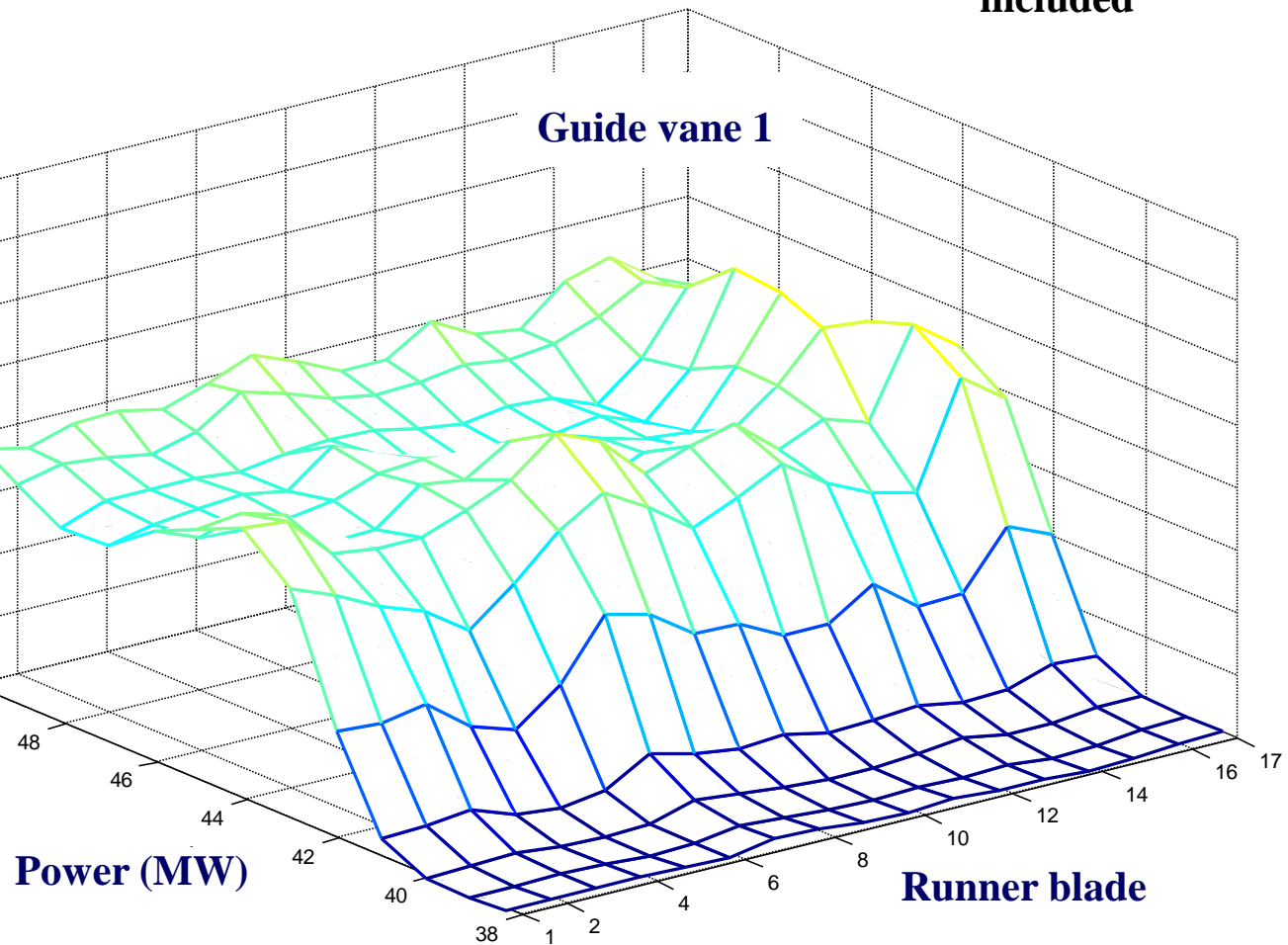
17 runner blades

## Detailed cavitation characteristic

For each guide vane - one characteristic

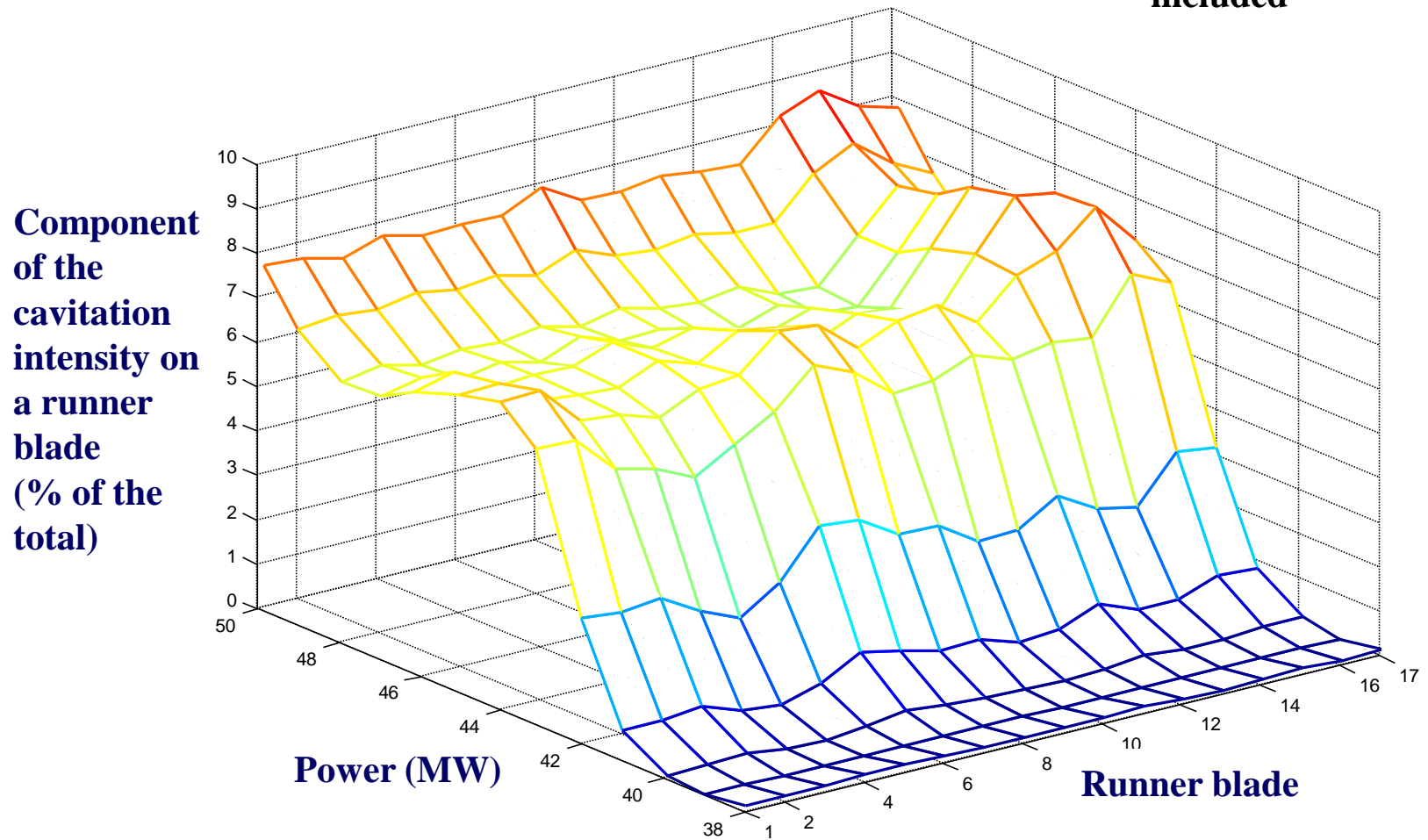
All cavitation  
mechanisms  
included

Component  
of the  
cavitation  
intensity  
on a runner  
blade,  
influenced  
by a guide  
vane  
(% of the  
total)



# Runner cavitation characteristic

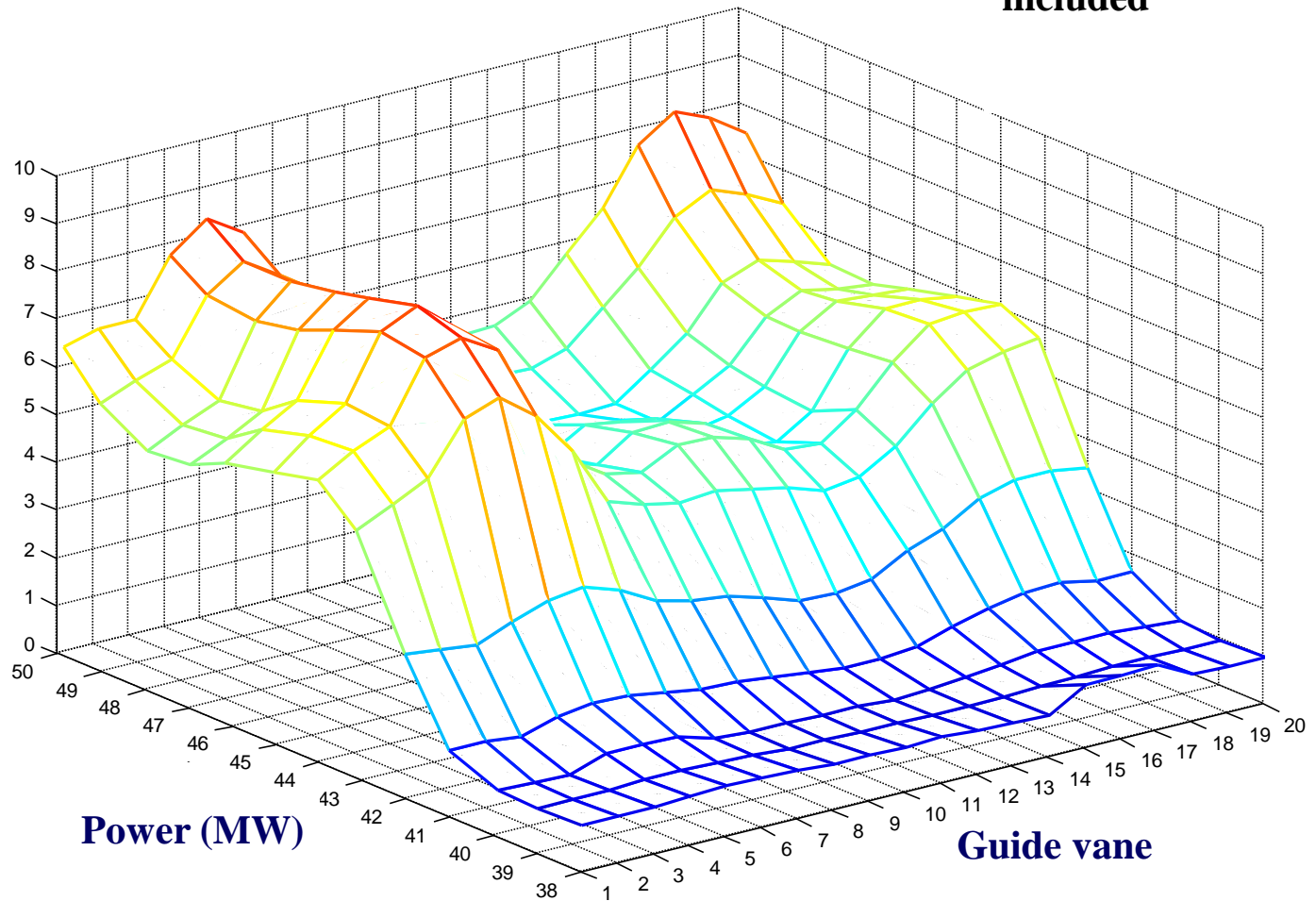
All cavitation mechanisms included



# Wicket gate cavitation characteristic

All cavitation mechanisms included

Component of the cavitation intensity influenced by a guide vane (% of the total)



Power (MW)

Guide vane

# Global cavitation characteristic

