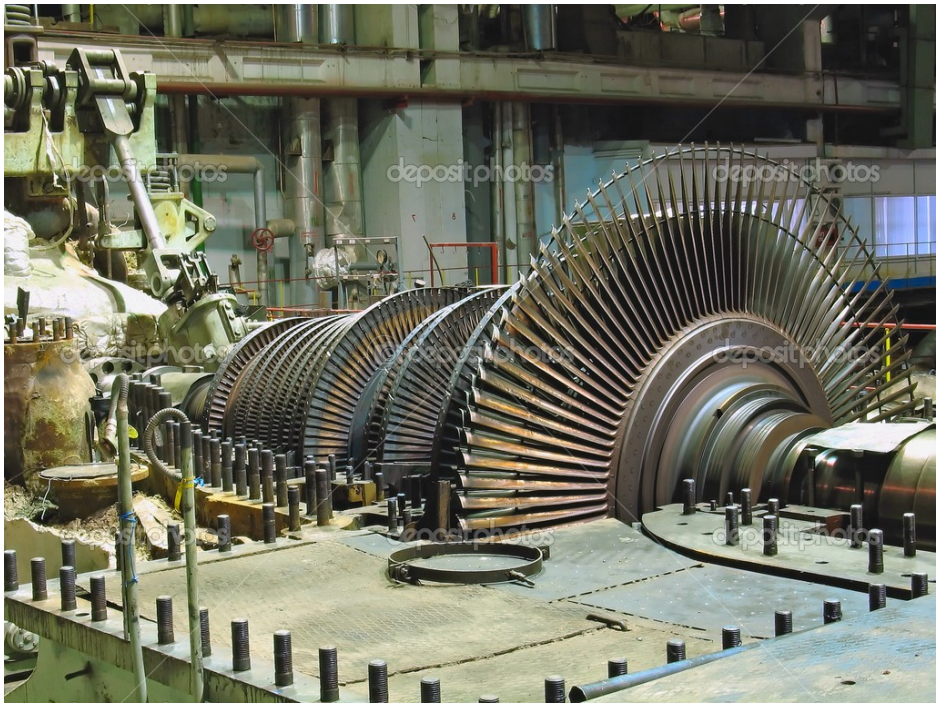
Aplicaciones de CFD en procesos de generación de energía.

M.I. Emilio Martínez Camacho

Posgrado de Ingeniería en Energía, UNAM
7 de abril de 2016

Aplicaciones comunes



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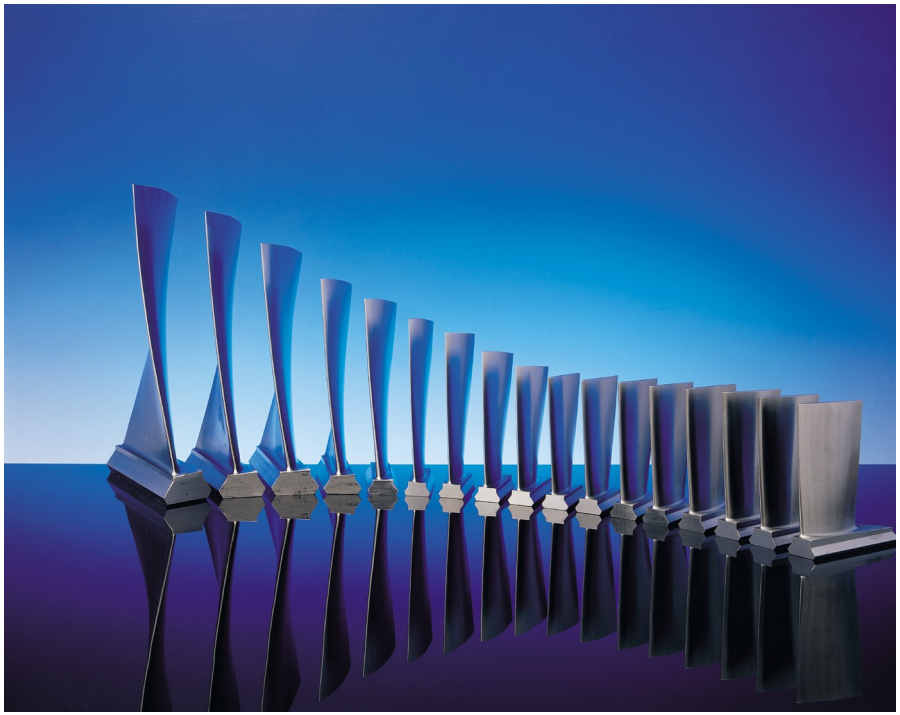
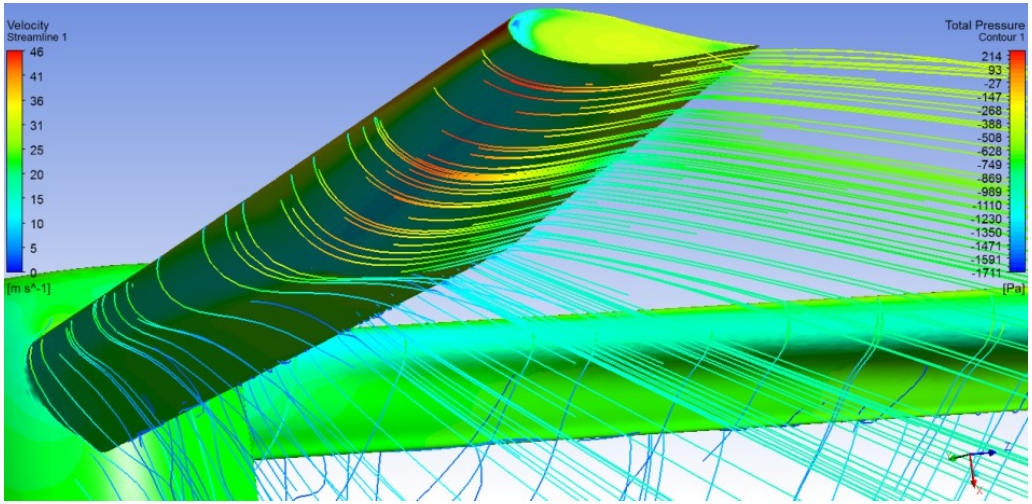


[2]

[1] http://sp.depositphotos.com/2273394/stock-photo-steam-turbine-during-repair-night.html
[2] http://img.etradeasia.com/customer/87612/comm/upimage/p_090610_07212.JPG

Aplicaciones comunes



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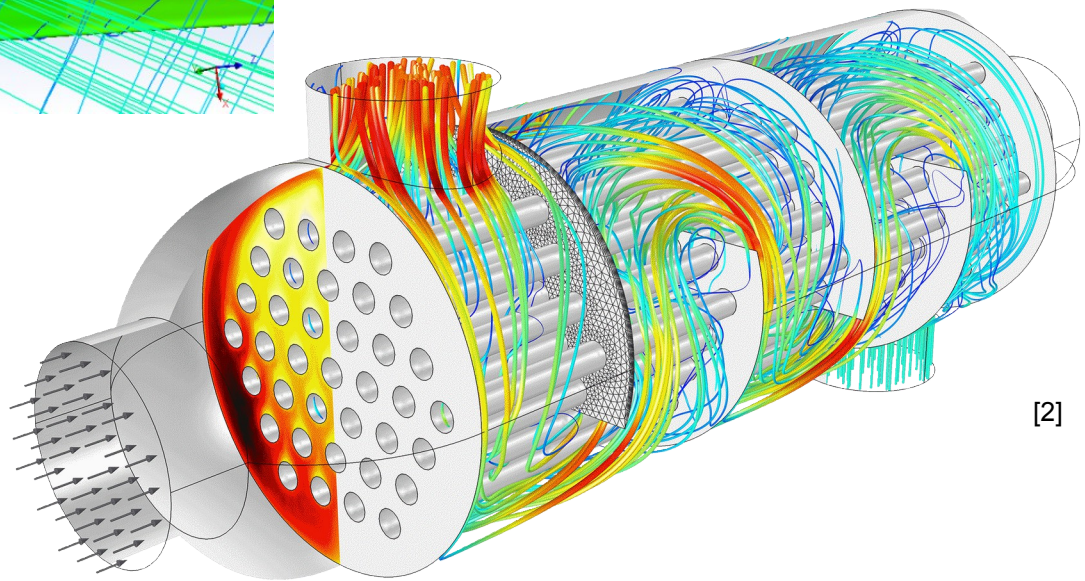
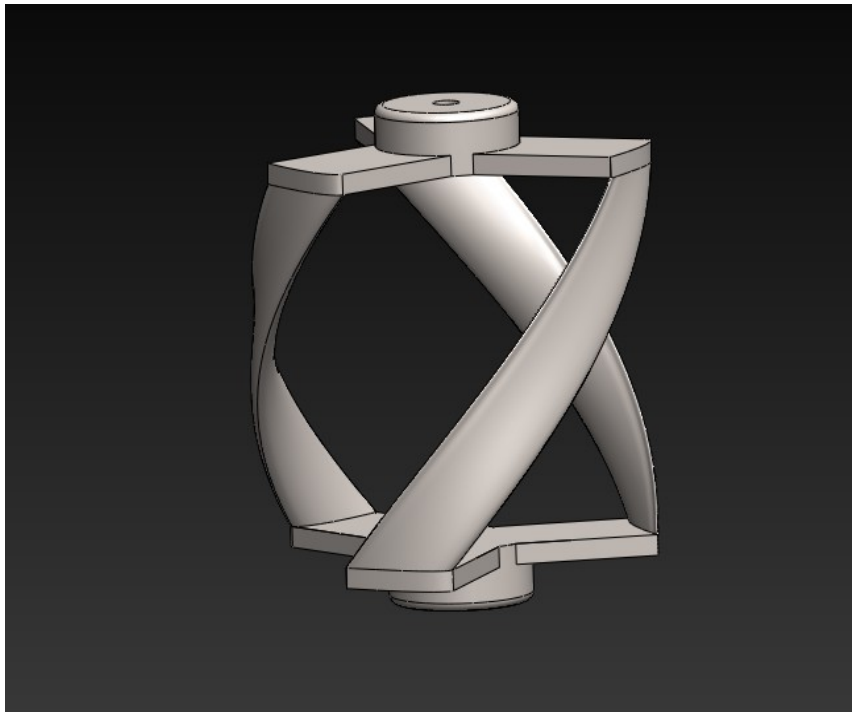
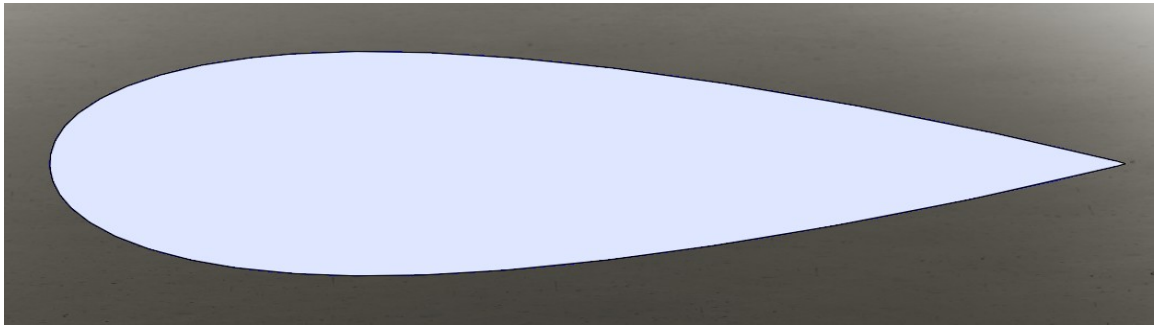


[2]

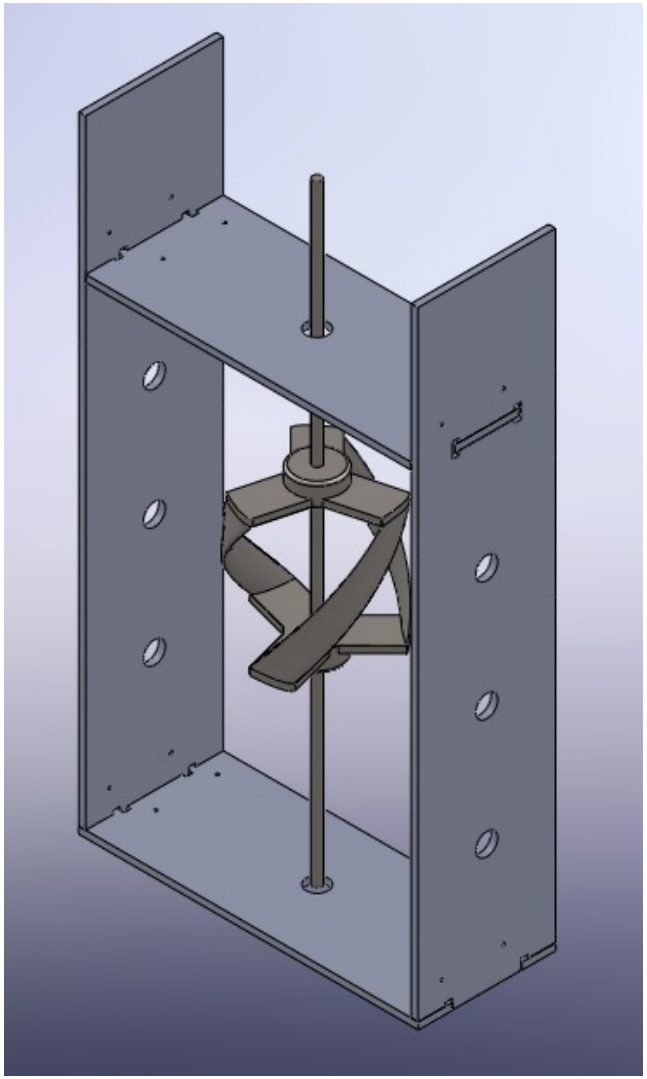
[1] https://jasf1961.wordpress.com/tag/reynolds/
[2] https://www.addlink.es/component/content/article?id=2126:destacados-fluidos-comsol-4-4

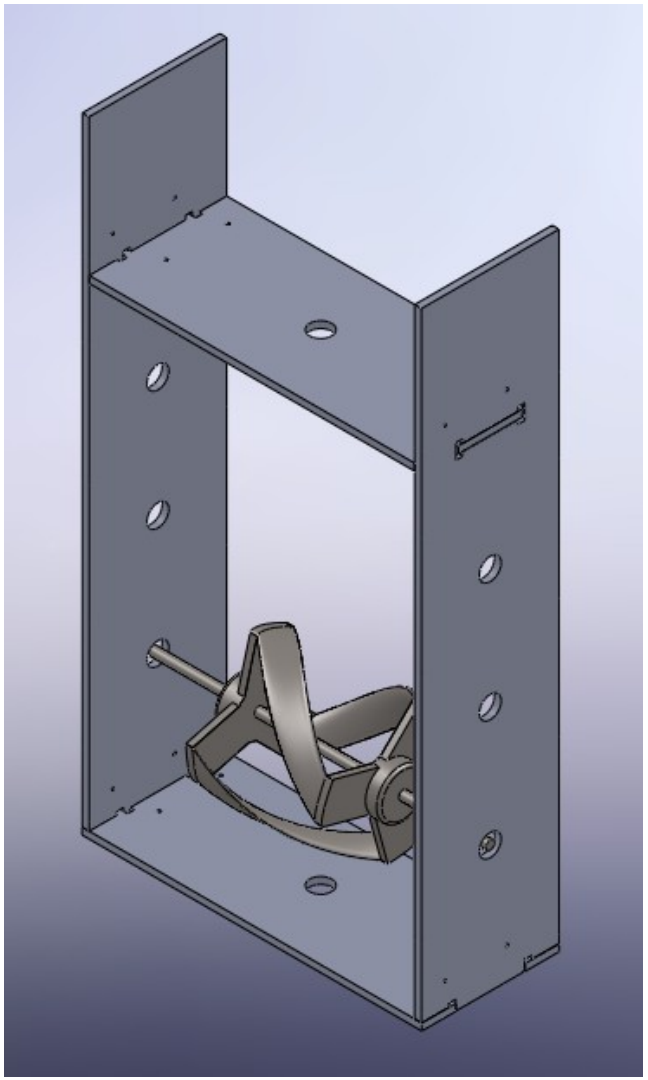
Turbina hidrocinética helicoidal



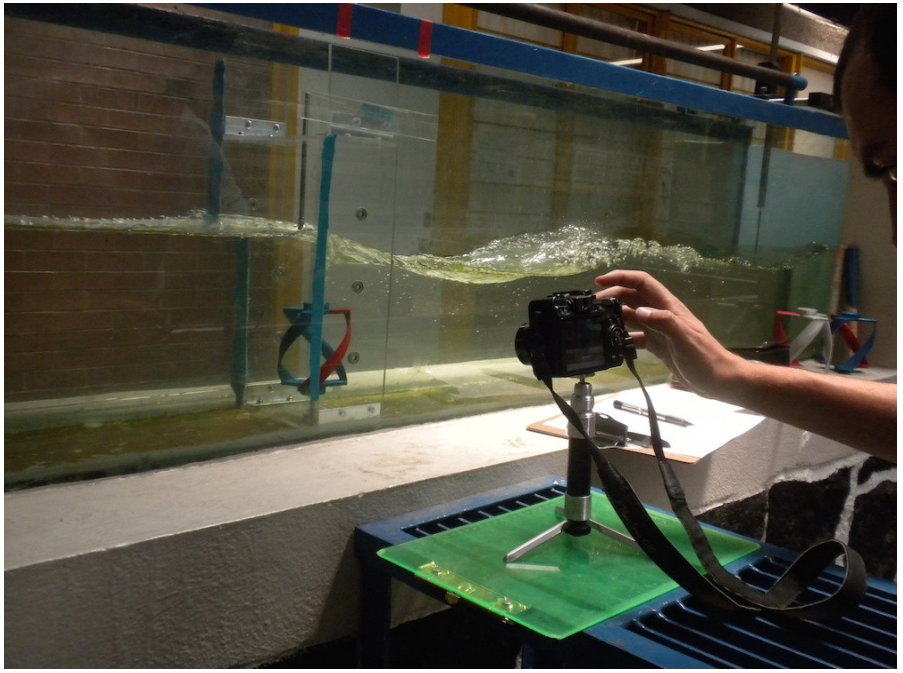


Estructura de sujeción

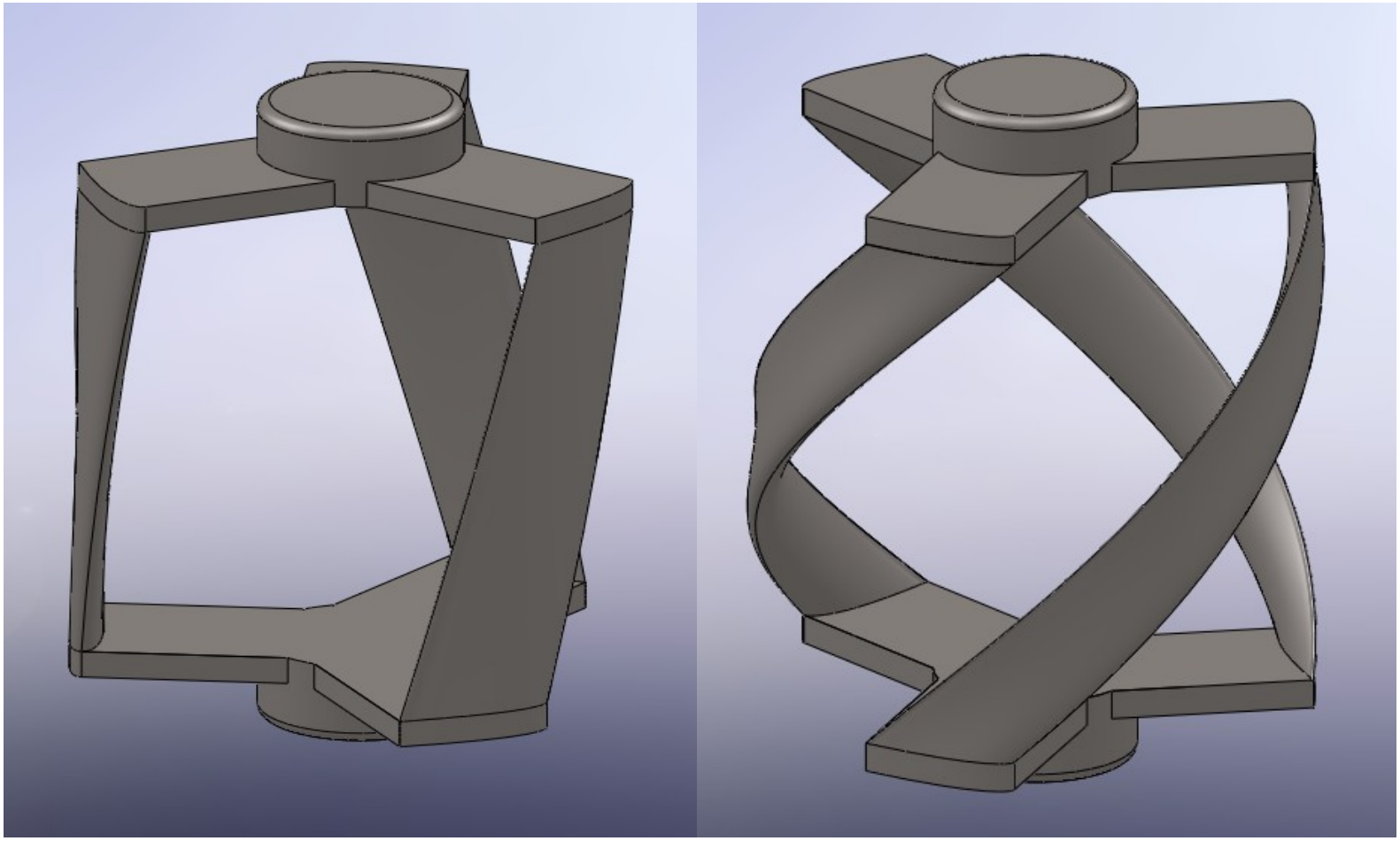




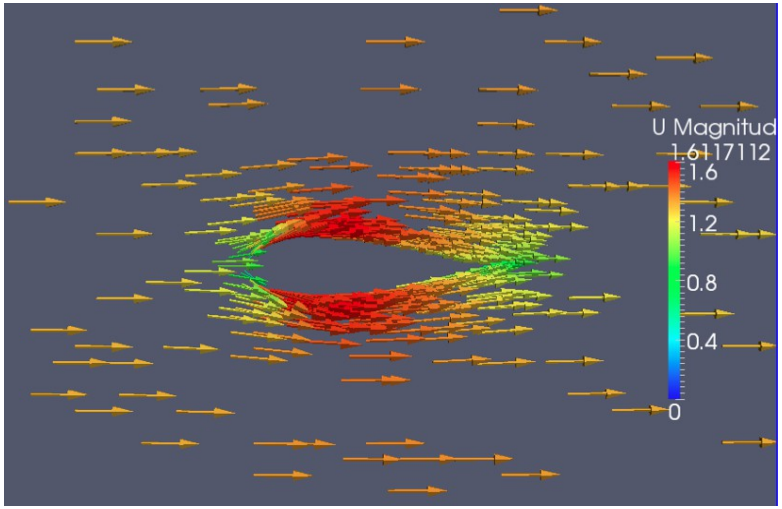
Experimentos

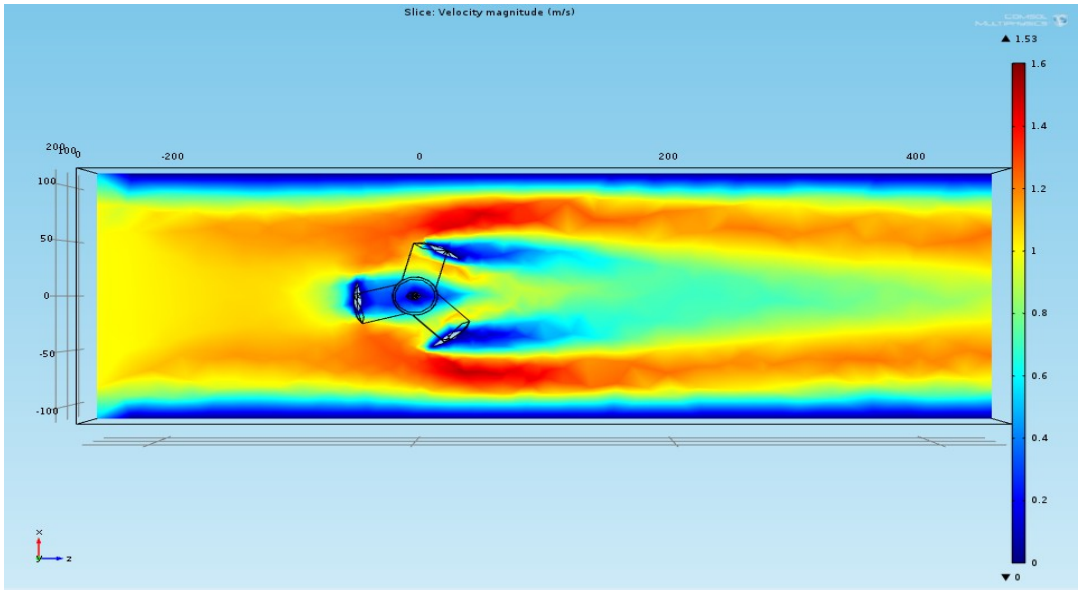


Modelos experimentales

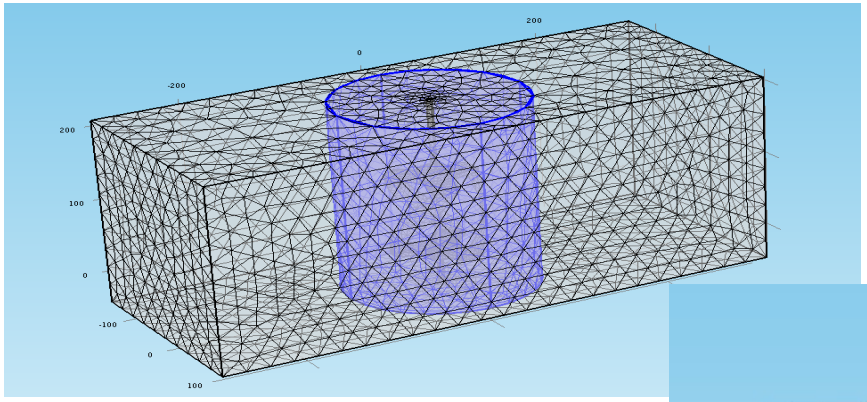


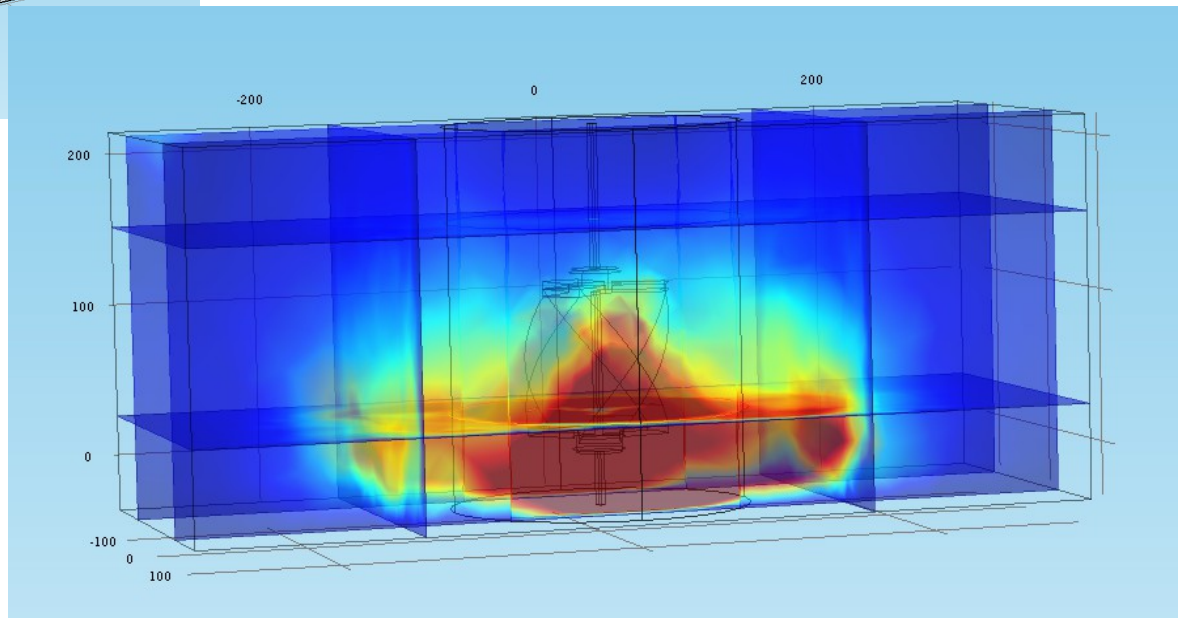
Simulaciones numéricas estacionarias





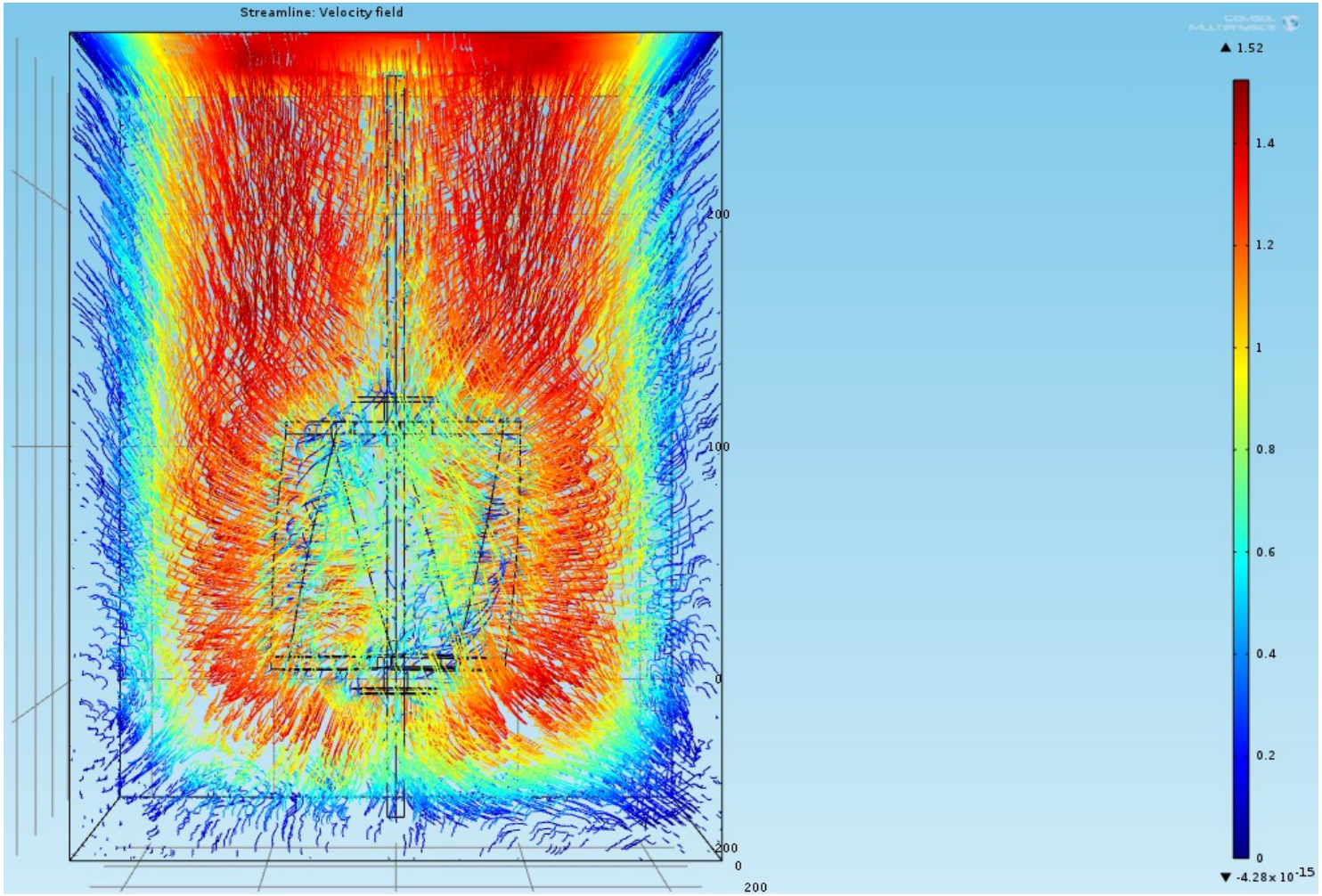
Simulaciones numéricas dinámicas



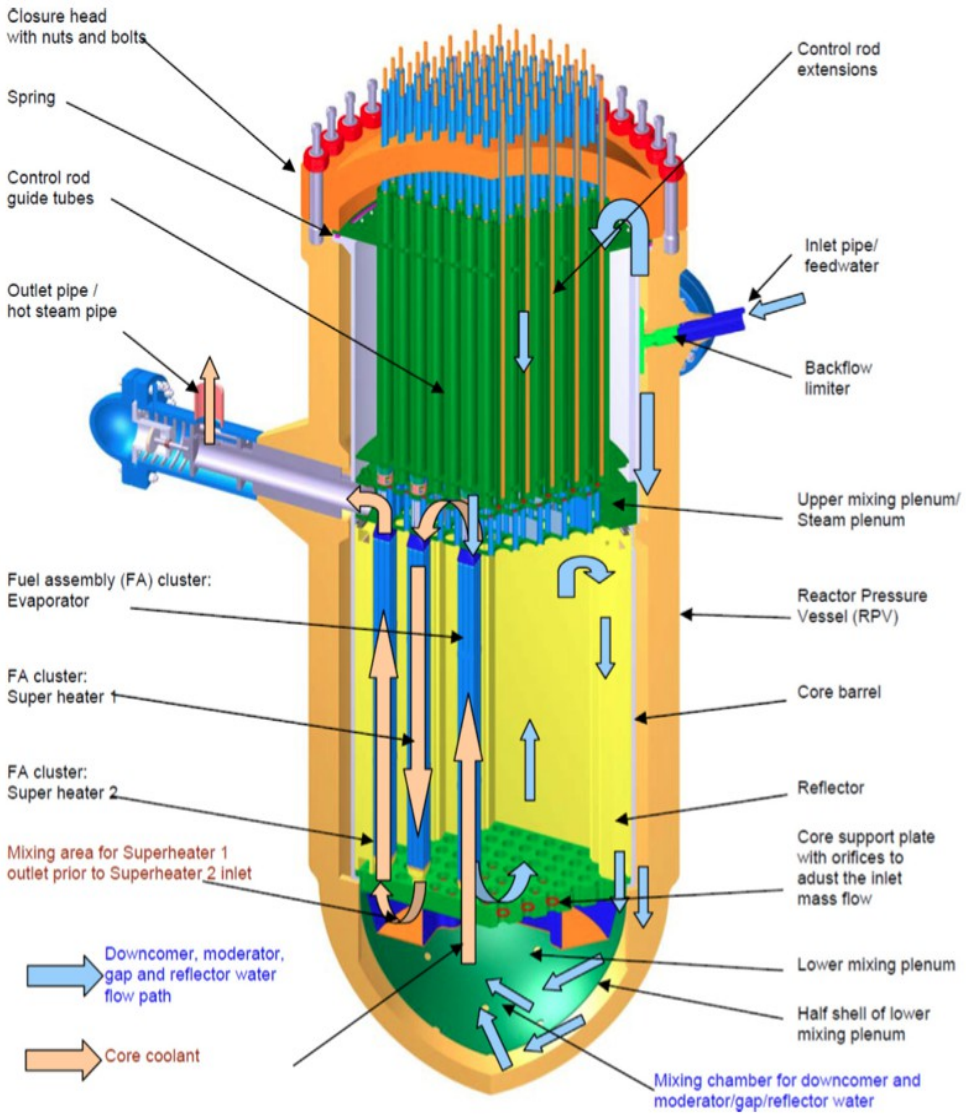


Turbina de 90º a 35 [mm] del fondo. La escala de colores va de 0 (azul) a 0.31 (rojo) [m/s]. Esta simulación se hizo a 6.5 [s] con una velocidad de rotación de 60 [RPM].

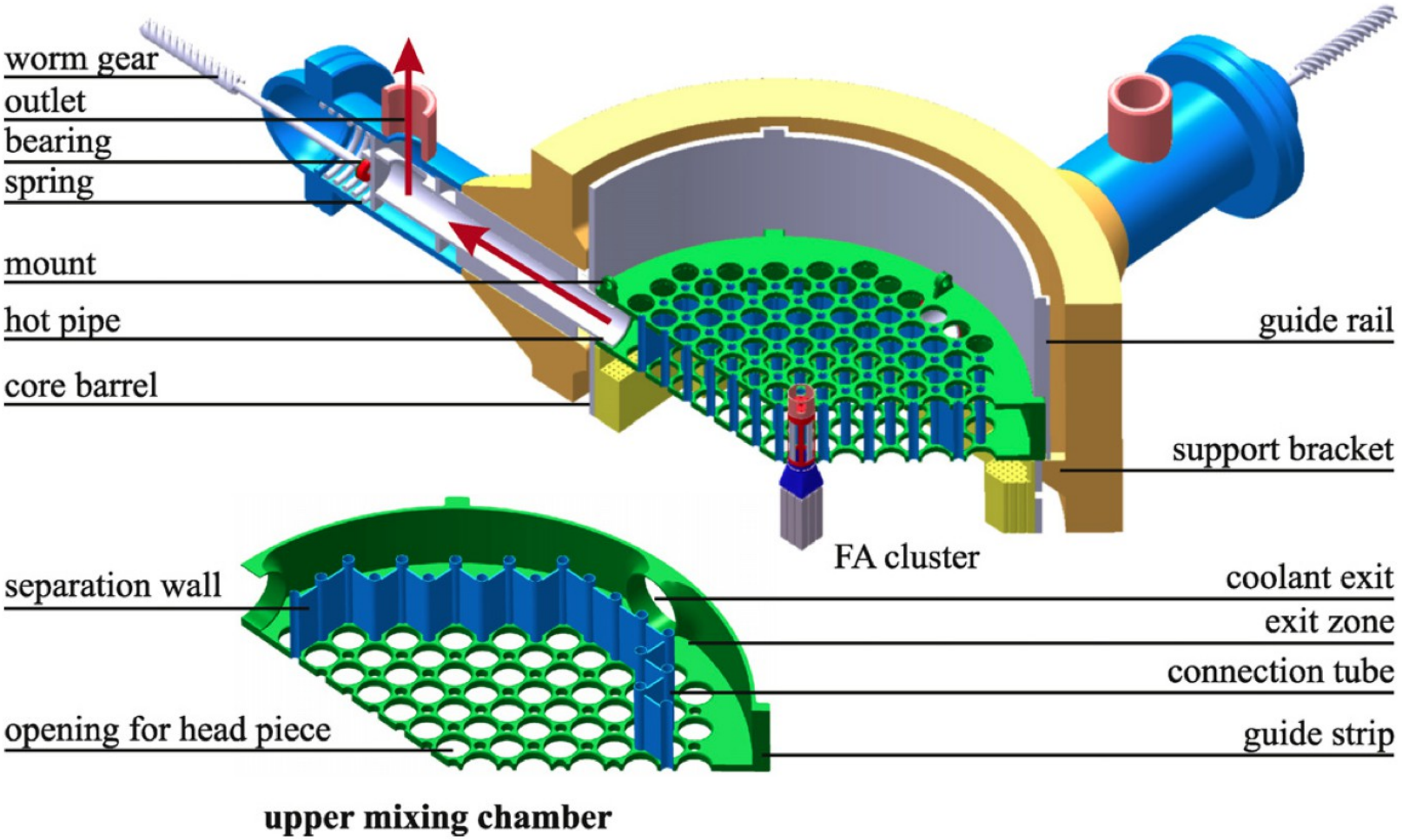
Simulaciones numéricas estacionarias



HPLWR


Closure head
with nuts and bolts
Spring
Control rod
guide tubes
Outlet pipe /
hot steam pipe
Control rod
extensions
Inlet pipe/
feedwater
Backflow
limiter
Upper mixing plenum/
Steam plenum
Fuel assembly (FA) cluster:
Evaporator
Reactor Pressure
Vessel (RPV)
FA cluster:
Super heater 1
Core barrel
FA cluster:
Super heater 2
Reflector
Mixing area for Superheater 1
outlet prior to Superheater 2 inlet
Core support plate
with orifices to
adust the inlet
mass flow
Downcomer, moderator,
gap and reflector water
flow path
Lower mixing plenum
Half shell of lower
mixing plenum
Core coolant
Mixing chamber for downcomer and
moderator/gap/reflector water

Pleno superior de mezcla / Vapor



Análisis de mezclado

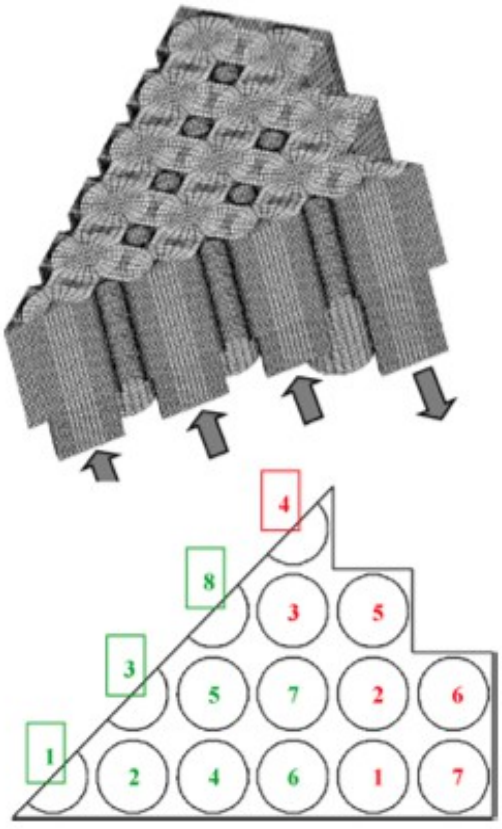


Fig. 5. Simplified model: grid and indicated in- and outlet positions.

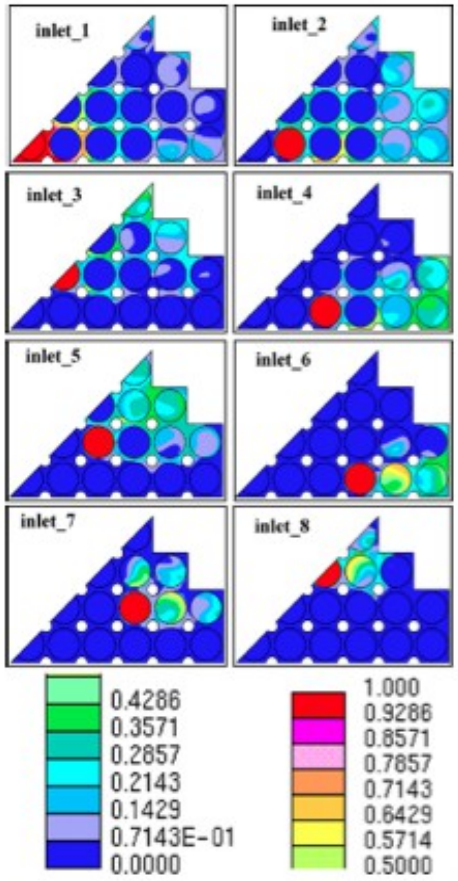
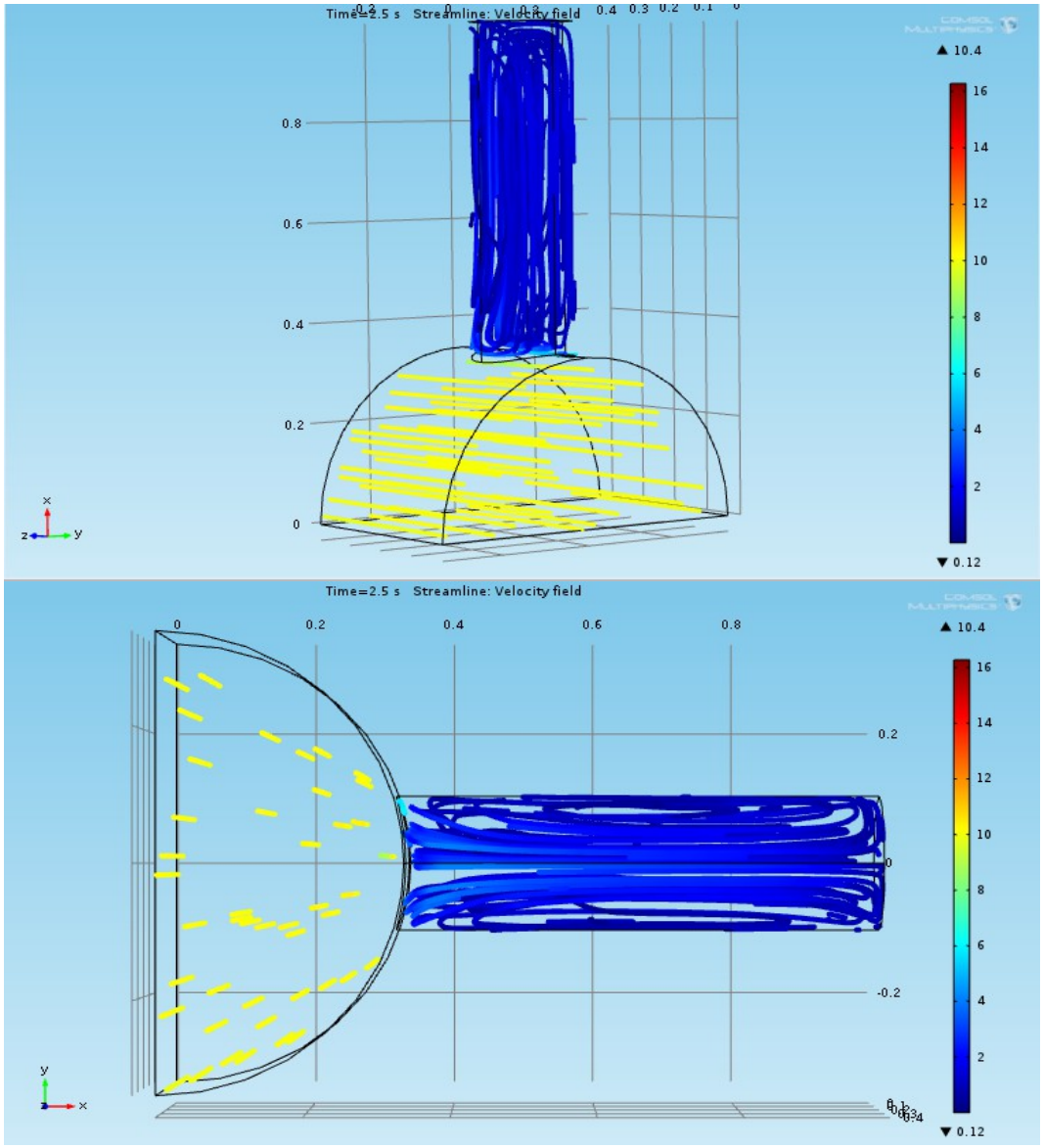


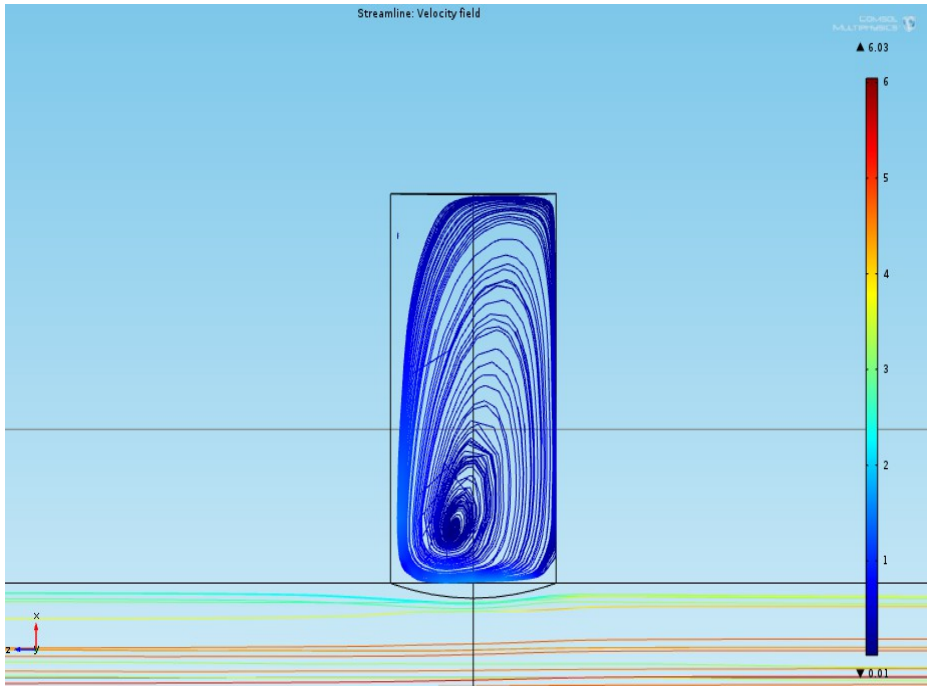
Fig. 6. Scalar concentrations in the upper mixing chamber seen from underneath.

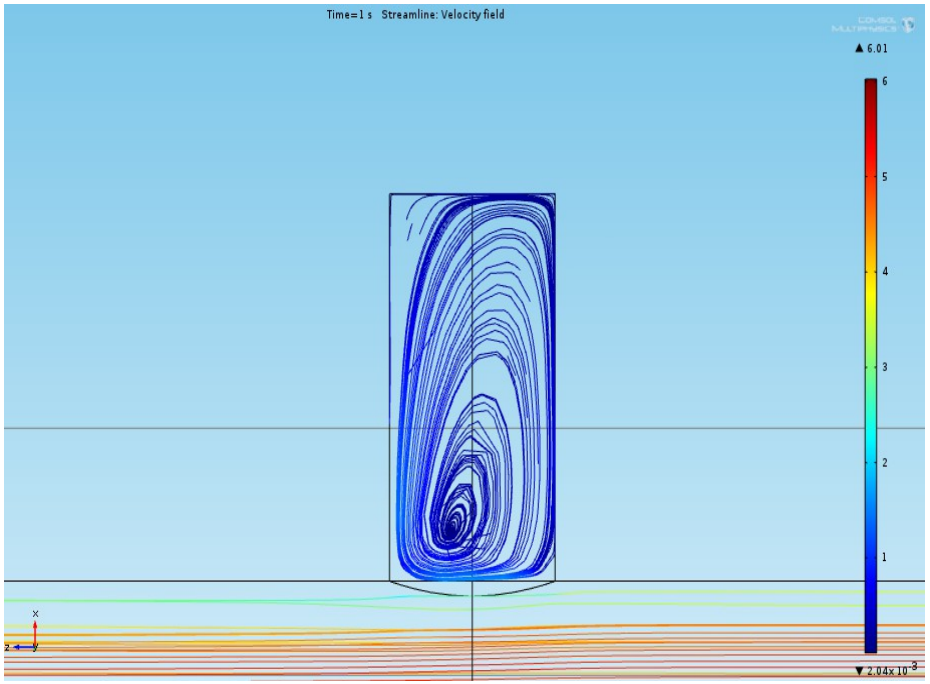
Wank A, Starflinger J, Schulenberg T, Laurien E, “Mixing of cooling water in the mixing chambers of the HPLWR – High Performance Light Water Reactor”, Nuclear Engineering and Design, vol. 240, pp. 3248–3258, 2010.

Sección de línea de vapor BWR



Sección de línea de vapor BWR





Muchas gracias por su atención

La conquista de la energía, José Chávez Morado. 1952.

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