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Title: Análisis y simulación de cargas de viento en un concentrador solar de canal parabólico mediante la aplicación de software

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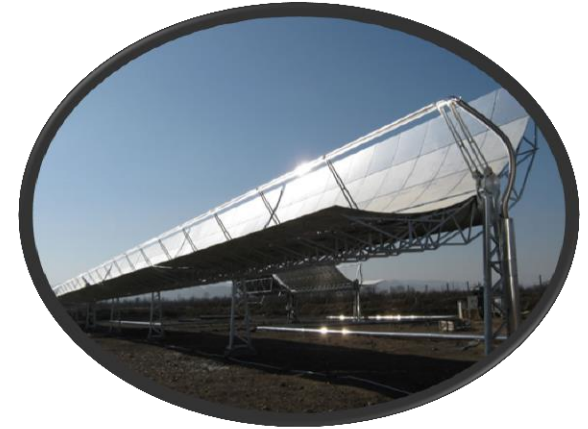
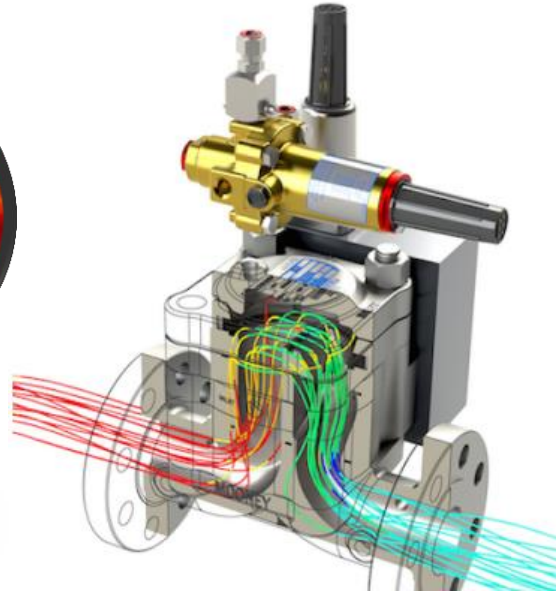
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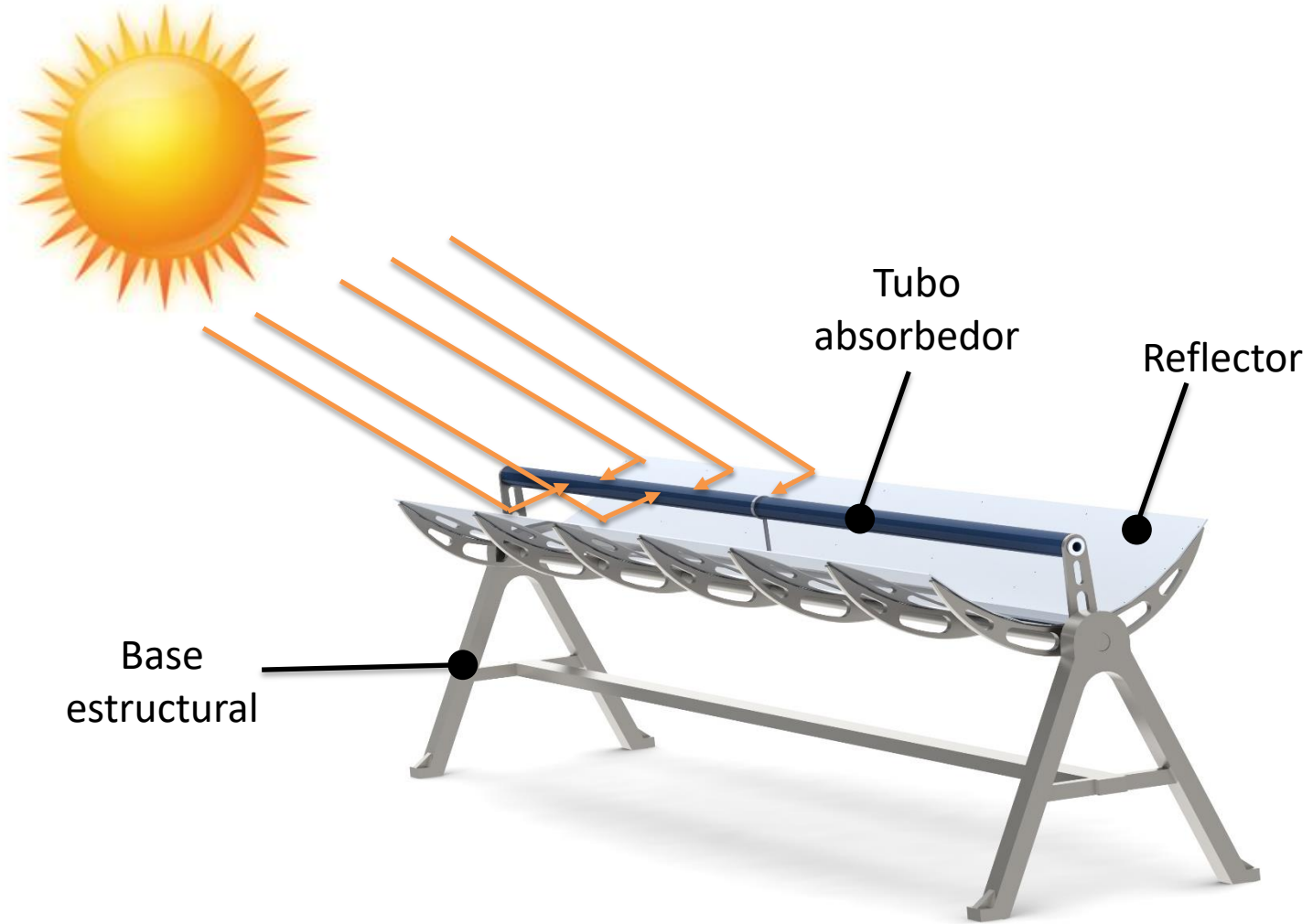
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Holdings

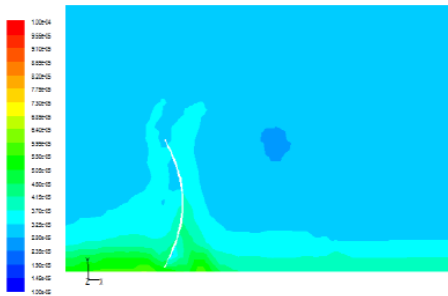
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| Czech Republic | | | |

Introducción

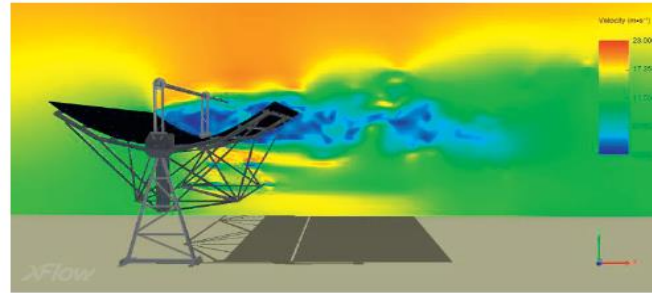




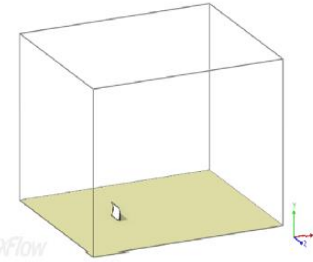
Antecedentes



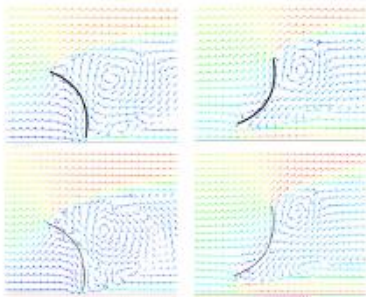
(Zhao et al., 2017)



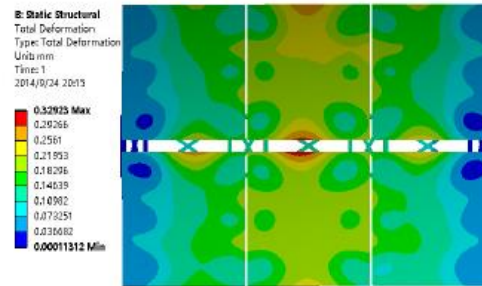
(Mier et al., 2015)



(Andre et al., 2015)



(Botello et al., 2016)



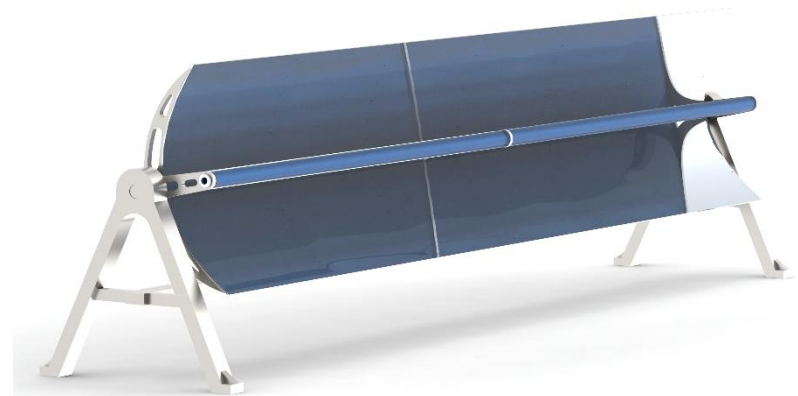
(Botello et al., 2015)



(Zemler et al., 2013)

Objetivo

Analizar y simular cargas de viento en un concentrador solar de canal parabólico (CCP) mediante el uso de dinámica de fluidos computacionales (CFD), utilizando el software Solidworks Flow Simulation para determinar las cargas provocadas en el dispositivo por éstas ráfagas.



Metodología

Diseño del concentrador de canal parabólico

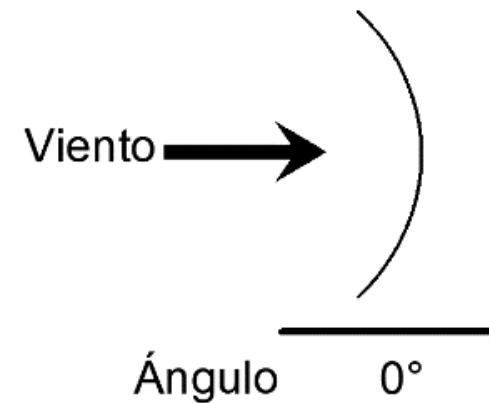
Recopilación de velocidades del viento de la zona

Dinámica de fluidos computacional

Características para el modelado del CCP en el software

| | |
|--------------------------|---|
| Base estructural | Perfil tubular rectangular (0.0381 m) |
| Concentrador (Reflector) | Lámina de aluminio de alta reflectividad (95%) |
| Tubo Receptor | Tubo de acero inoxidable (0.032 m) y tubo de vidrio evacuado (0.08 m) |
| Área de apertura | 4 m ² |
| Longitud | 4 m |
| Ángulo de borde | 90° |

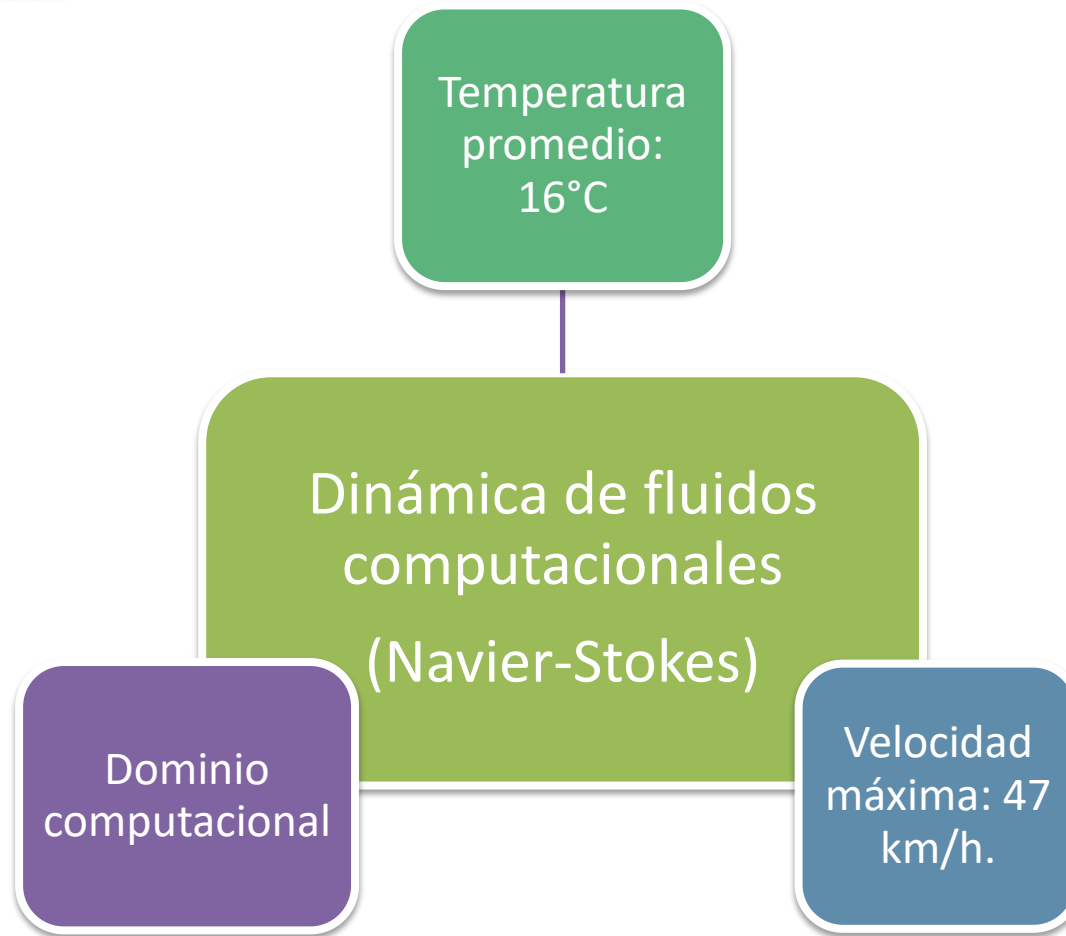
Ángulo de inclinación del CCP

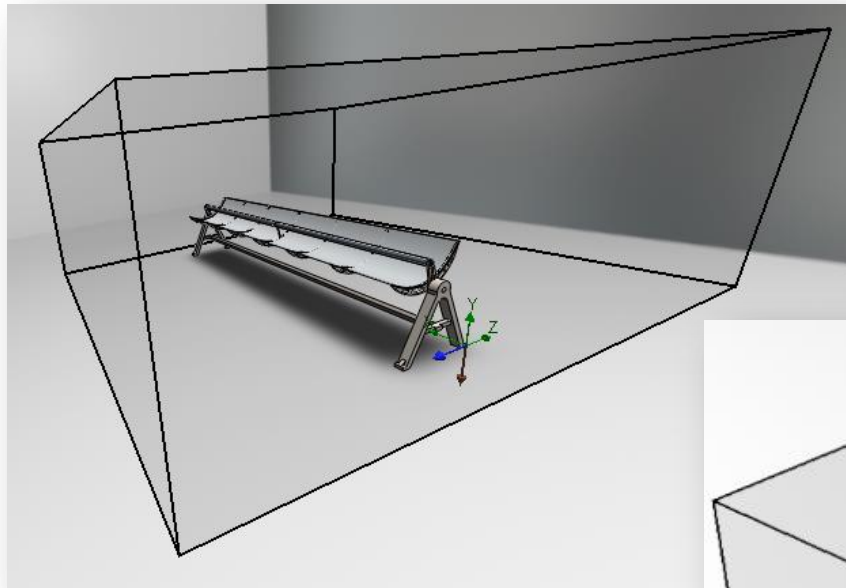


Ubicación de la estación meteorológica del Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP), en el Instituto Tecnológico Superior de Huichapan

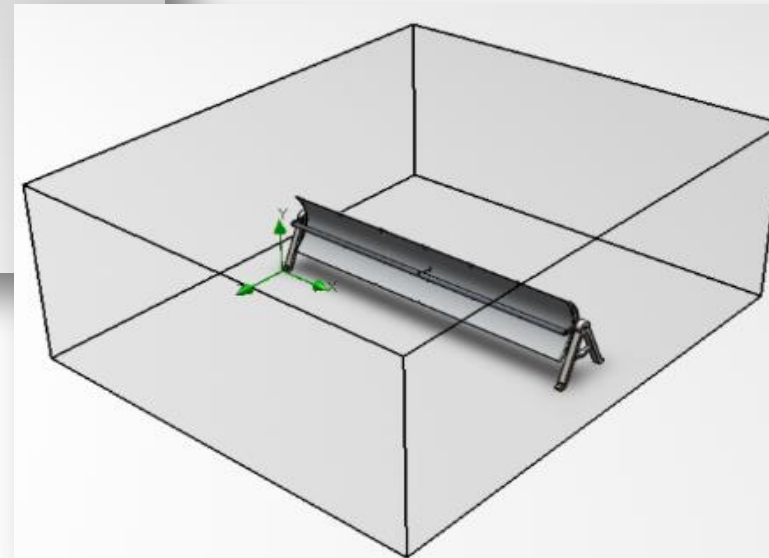








Fuente: Google Maps, 2016.





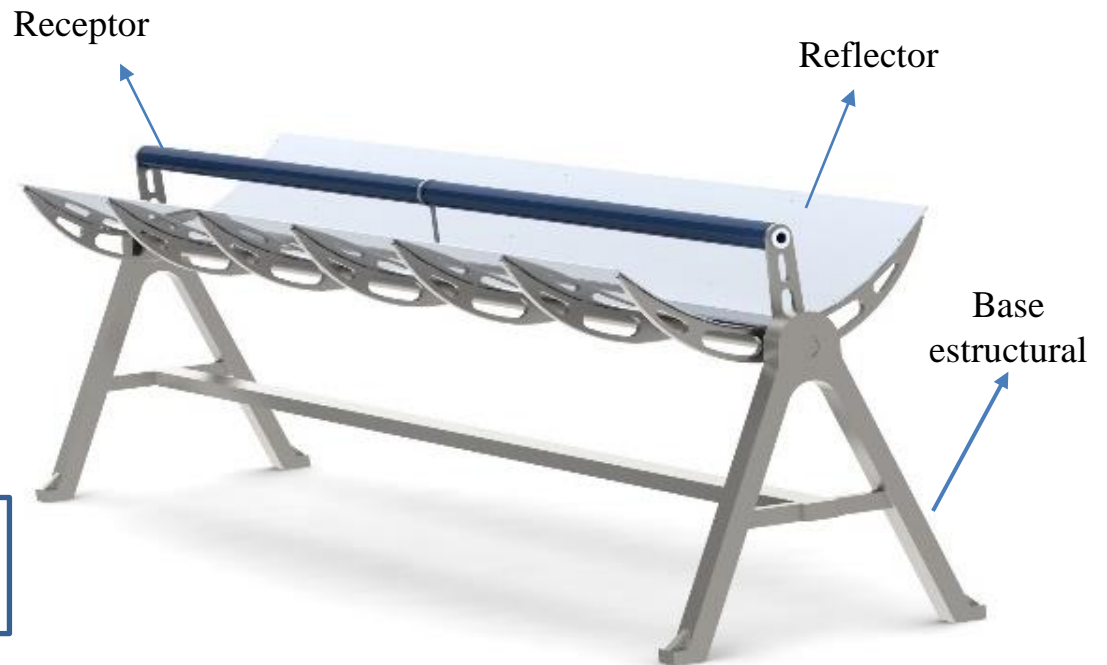
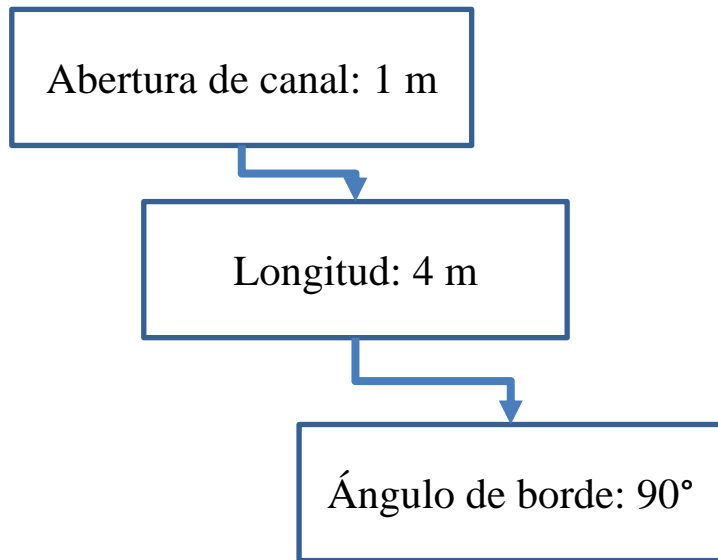
Dominio computacional



| Size and Conditions | |
|---|------|
|  x | 6 m |
|  x | -6 m |
|  y | 6 m |
|  y | 0 m |
|  z | 8 m |
|  z | -4 m |

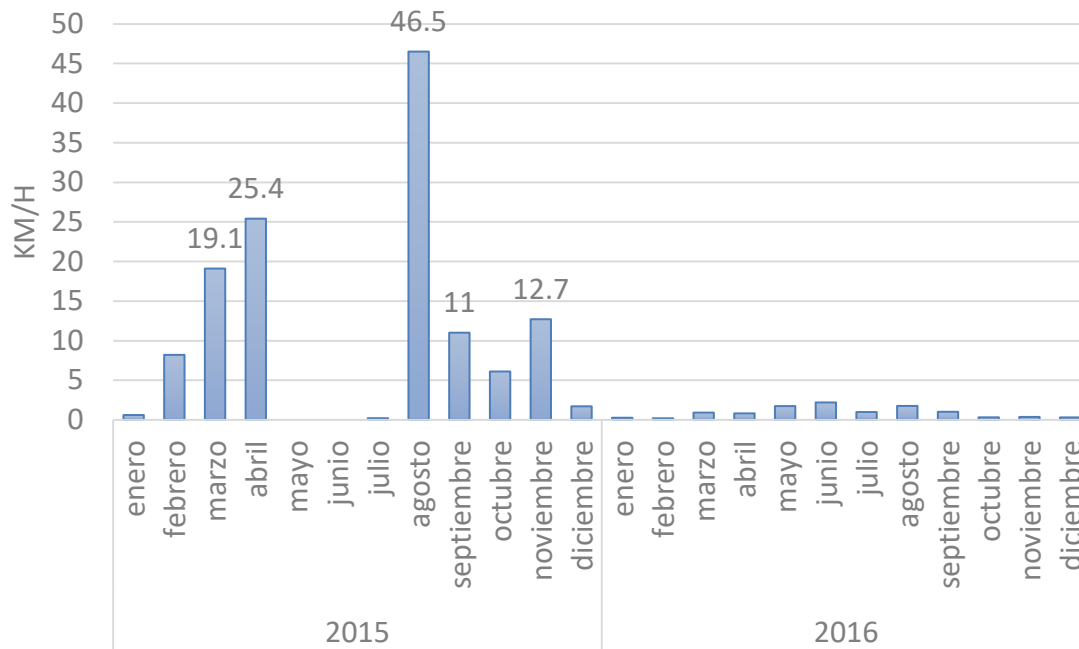
Resultados

Diseño del concentrador de canal parabólico



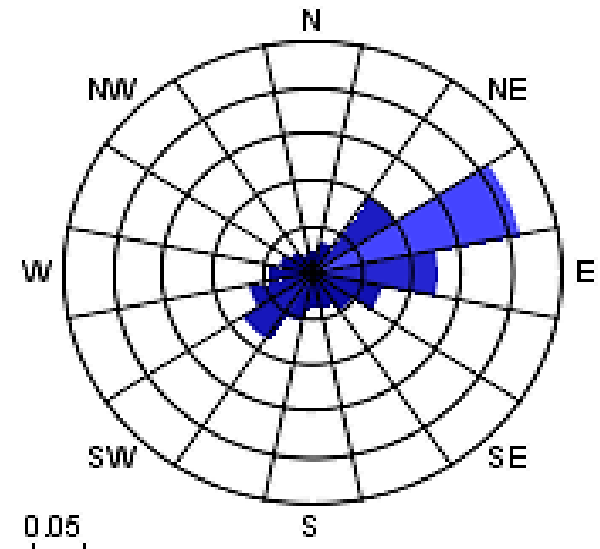
Recopilación de velocidades del viento de la zona

Historial de velocidades máximas del viento en El Saucillo, Huichapan. Hgo.



Fuente: (INIFAP, 2010)

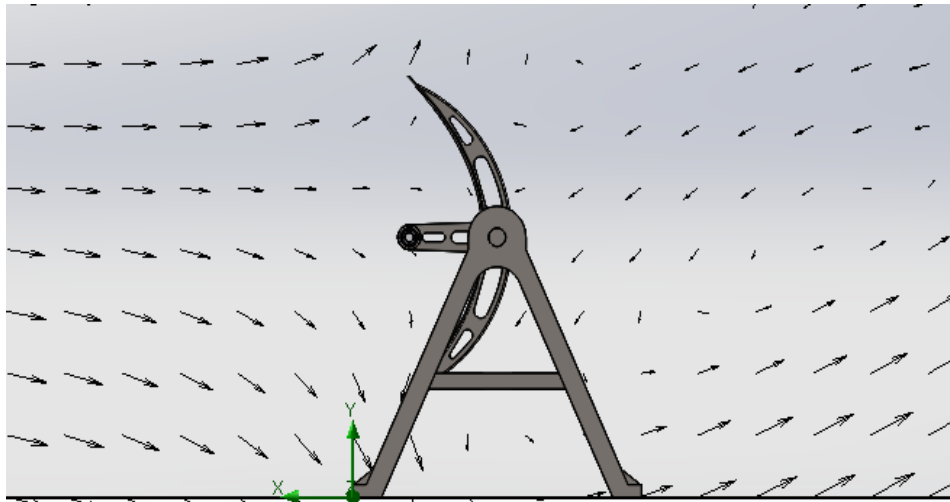
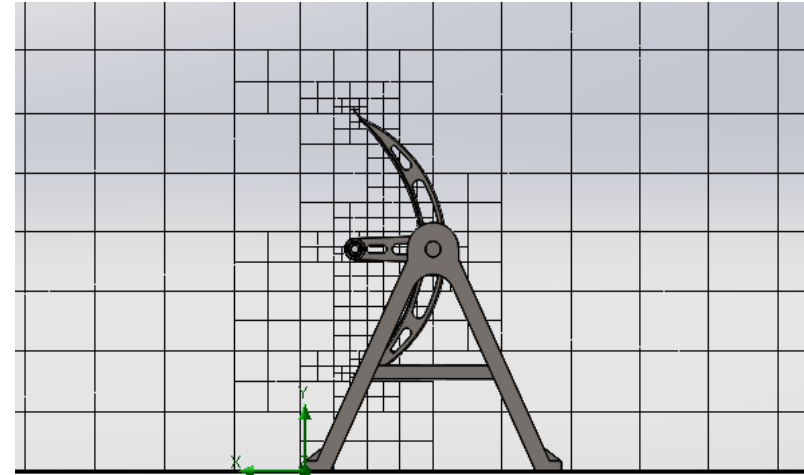
Rosa de vientos en El Saucillo, Huichapan, Hgo.



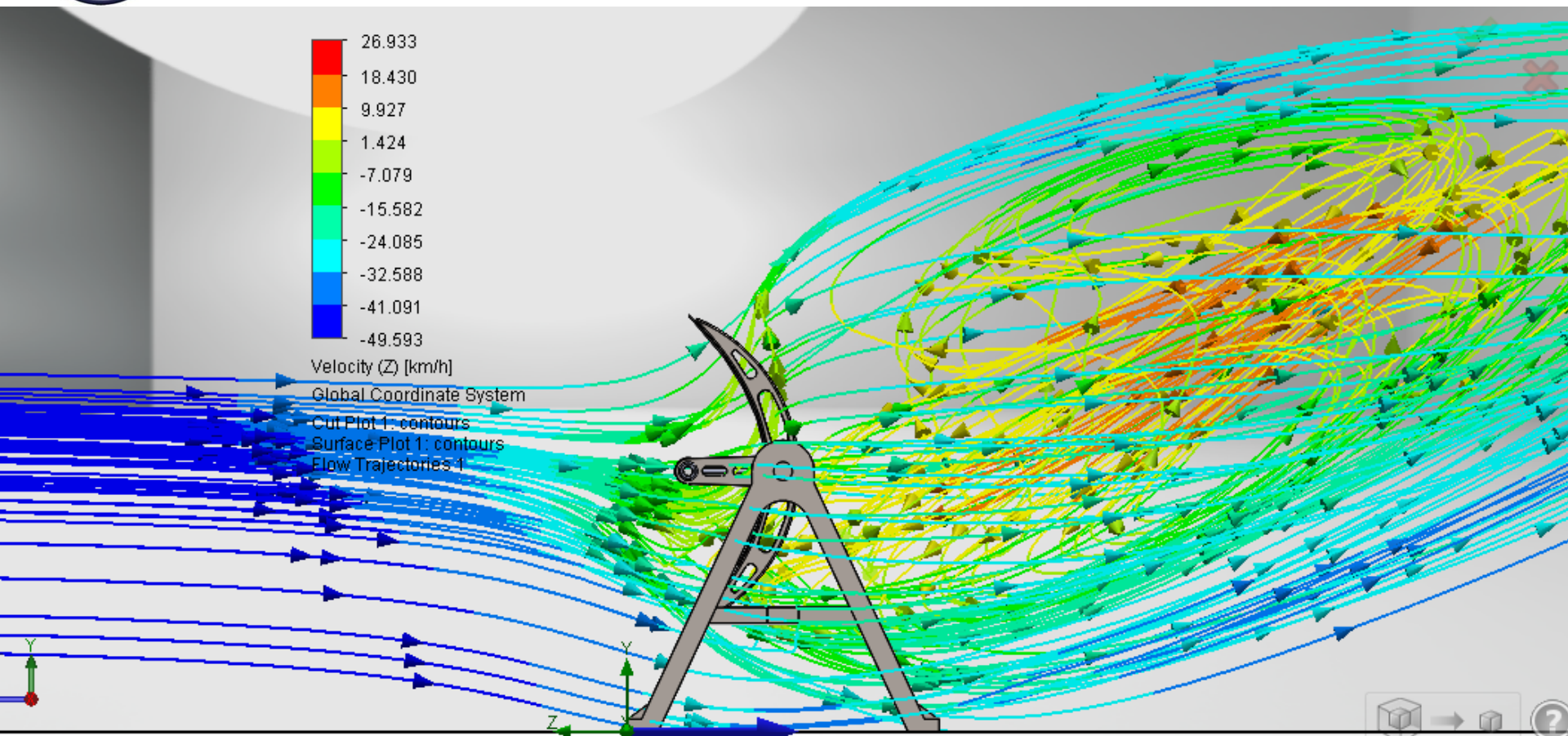
Fuente: AWS TRUEPOWER, Windnavigator.
Recuperado el 06 de febrero de 2017 de:
<https://dashboards.awstruepower.com/wsa>

Dinámica de fluidos computacionales

Creación y refinamiento de la malla para la solución numérica



Distribución de velocidad en el CCP



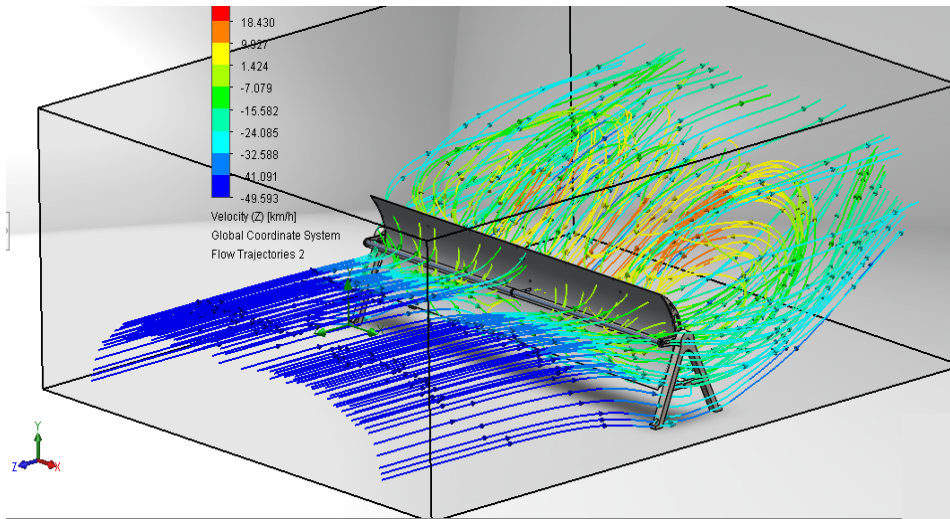
Simulación computacional del fluido (Vista lateral)



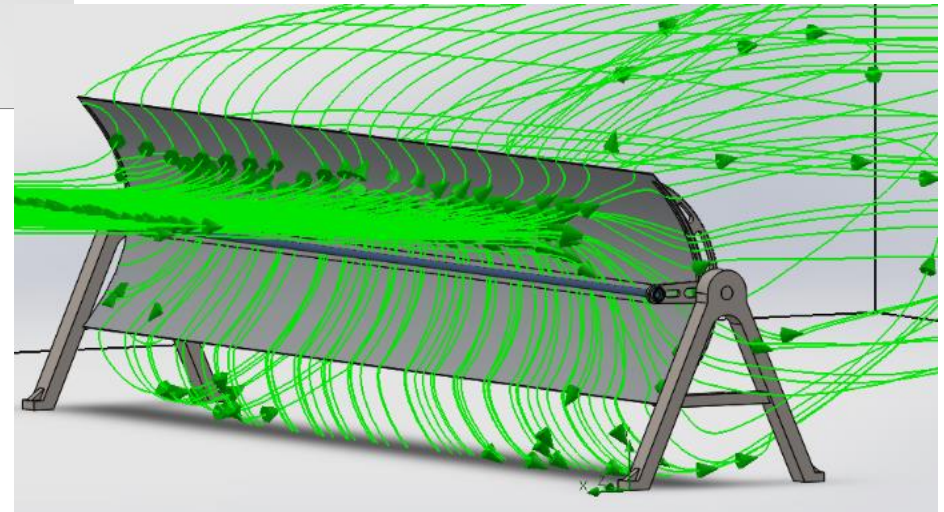
Ubicación de puntos de mayor presión en el CCP

Ubicación y valores de mayor presión en el CCP

| X (m) | Y (m) | Z (m) | Presión (kPa) |
|--------|-------|-------|---------------|
| -0.451 | 0.913 | 1.773 | 101.416 |
| -0.451 | 0.916 | 1.212 | 101.415 |
| -0.455 | 0.880 | 3.730 | 101.416 |
| -0.455 | 0.874 | 3.169 | 101.417 |

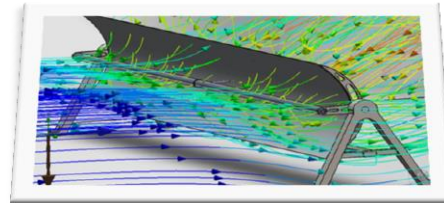


Simulación del fluido en el CCP (Trayectoria del viento)



Conclusiones

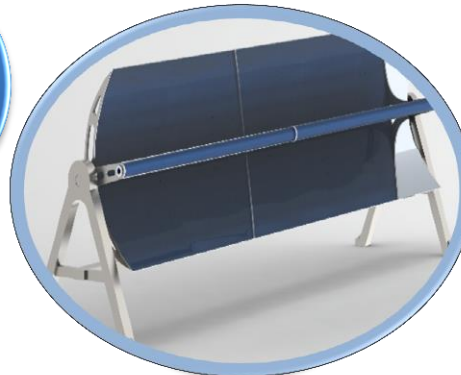
Carga de presión: 101.523 kPa
Fuerza Normal: 422.236 N



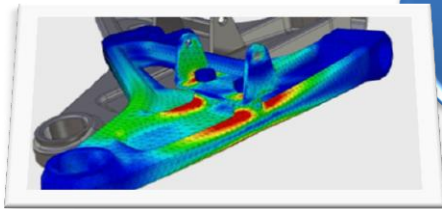
Evaluación del CCP



Reducción de costos



Futuros trabajos



Reducción de tiempos



Geometría en el análisis

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