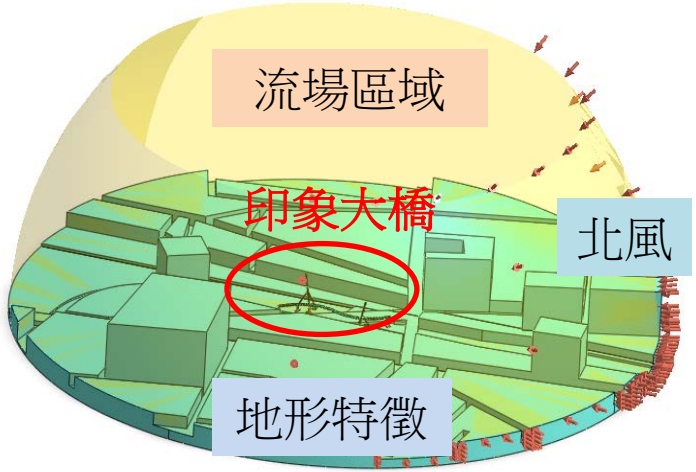
MIDAS NFX

印象大橋-流固耦合計算

台灣邁達斯

印象大橋-流固耦合(Fluid-Structure Interaction)計算-1



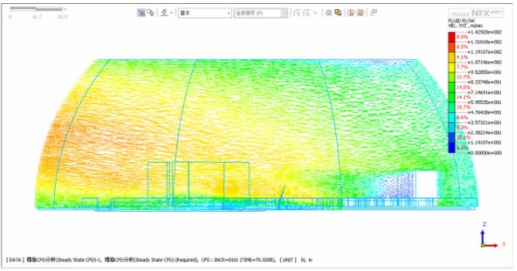
- 單向耦合(one –way coupling)
  - ➢ 先計算流場,再計算結構
- 雙向耦合(Two –way coupling)
  - ➢ 流場和結構同時計算

	1級	2級	3級	4級	5級	6級	7級	8級	9級	10級	11級	12級	13級	14級	17級
風速 m/se	1.5	3.3	5.4	7.9	10.7	13.8	17.1	20.7	24.4	28.4	32.6	36.9	41.4	46.1	61.2
東	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
西	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
南	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
北	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
東北	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
東南	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
西北	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
西南	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

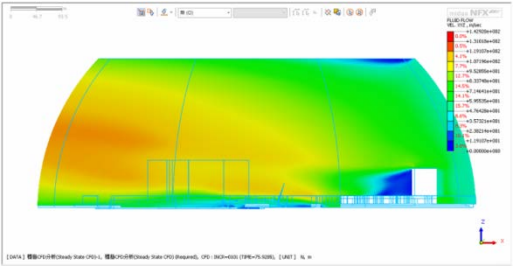
註:1~14級和17級採單向耦合計算，再針對常見風場風速計算雙向耦合。

印象大橋-流固耦合(Fluid-Structure Interaction)計算-2

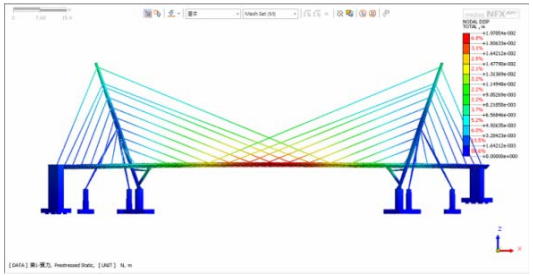
Step1.風場分析 → Step2.橋體結構強度分析 → Step3.橋體結構共振計算



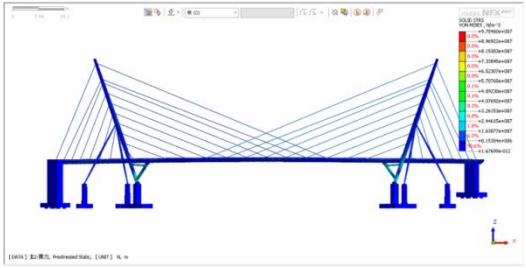
北風14級



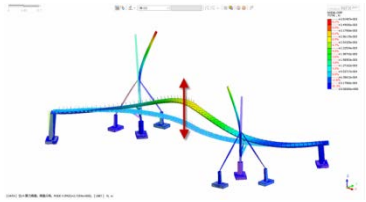
北風14級



橋體變形(mm)

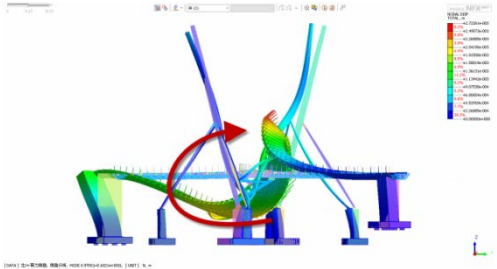


橋體應力(N/m²)



垂直

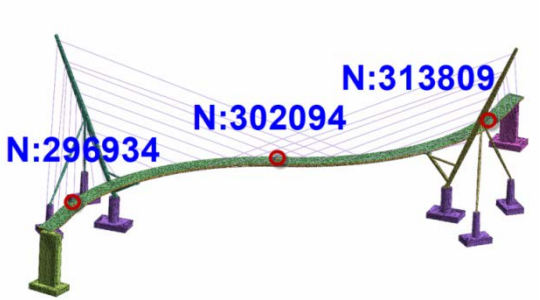
縱向



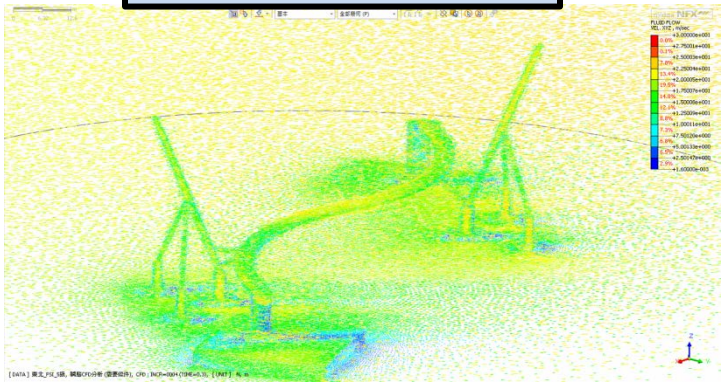
扭曲

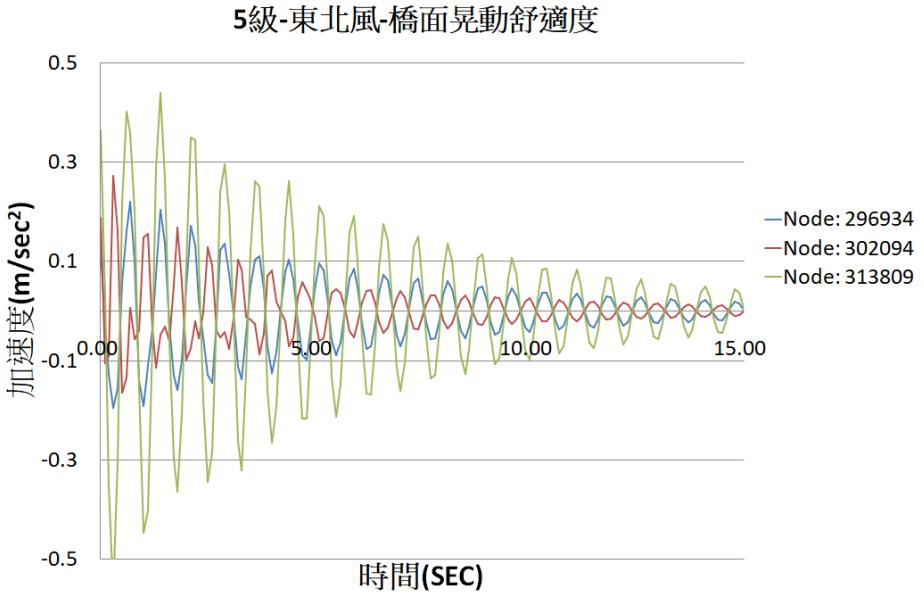
印象大橋-流固耦合(Fluid-Structure Interaction)計算-3

風場和橋體結構雙向耦合分析



風場-流速分佈



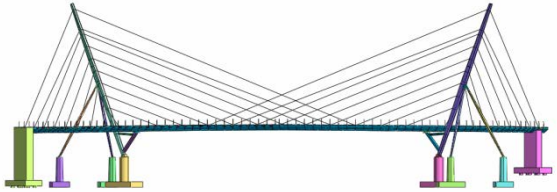


舒適性評估指標(ISO 2631-1)

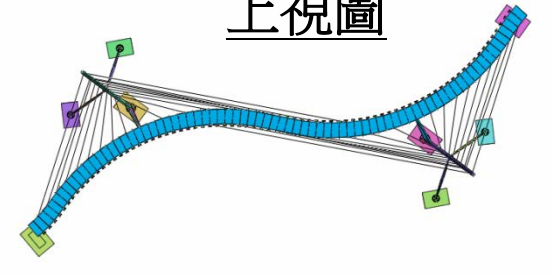
加速度範圍	舒適性
小於 0.63m/s^2	無不舒服~一點不舒服
0.5 ~1 m/s^2	輕微不舒服
0.8 ~1.6 m/s^2	不舒服
1.25 ~2.5 m/s^2	非常不舒服
大於 2 m/s^2	極為不舒服

3D分析模型

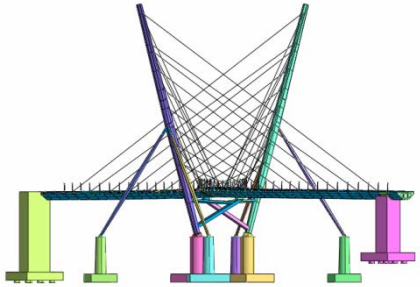
前視圖



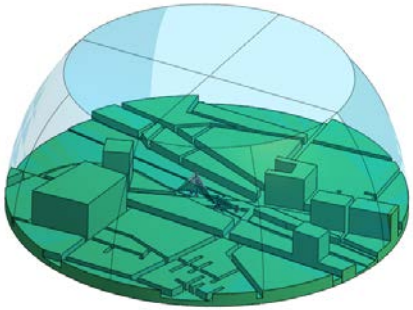
上視圖

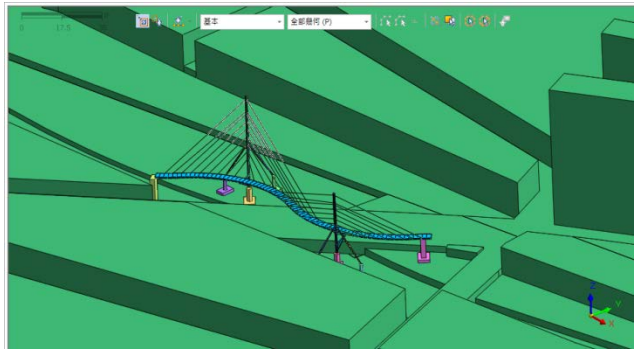


側視圖



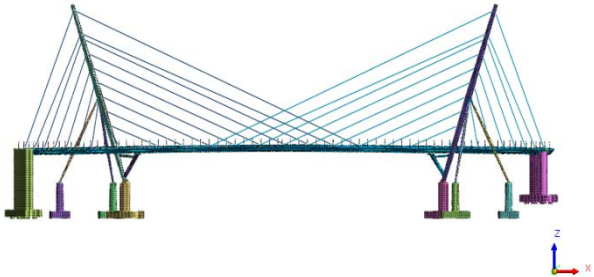
風場與地形



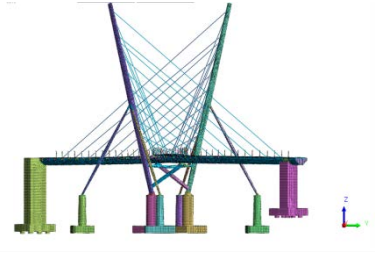


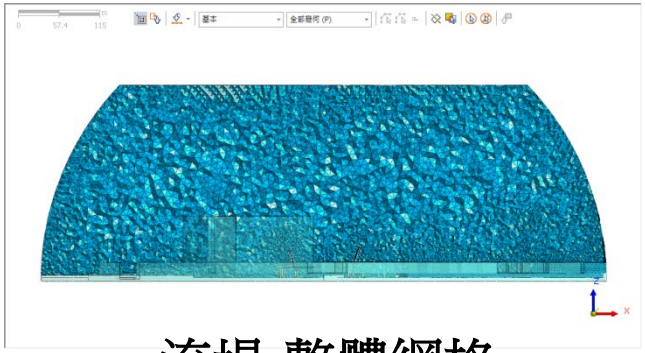
有限元素模型

前視圖



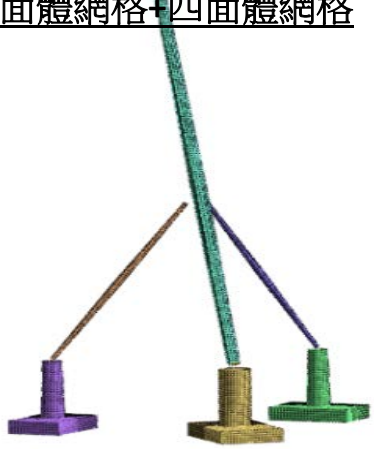
側視圖



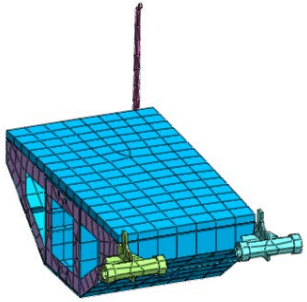


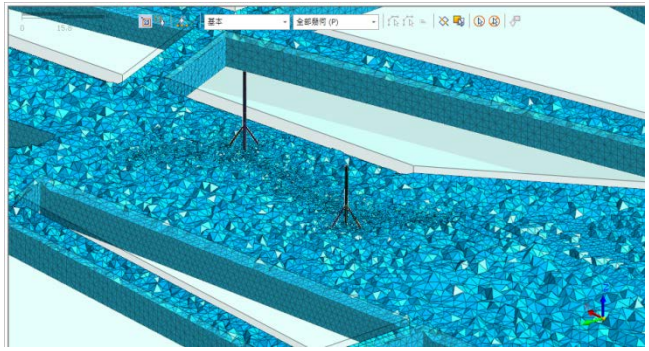
流場-整體網格

六面體網格+四面體網格



2D元素+六面體網格+四面體網格

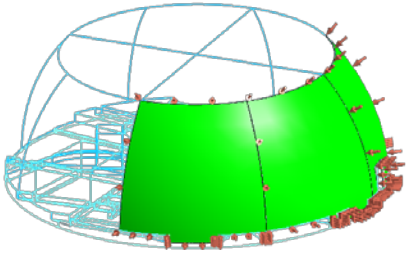




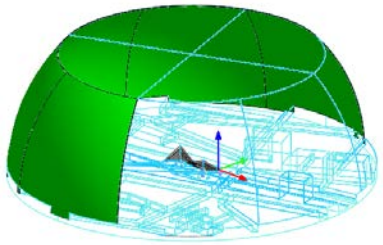
流場-局部網格

邊界條件

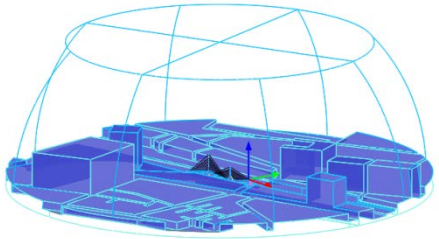
CFD邊界條件



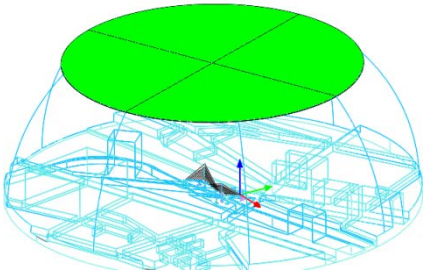
入流口



出流口

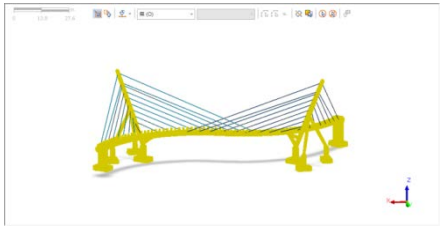


壁函數
(空氣與實體接觸區域)

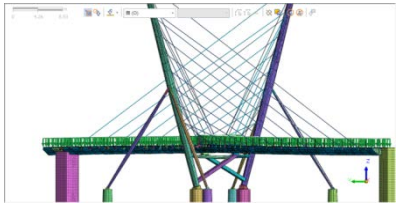


無限邊界(對稱流速)

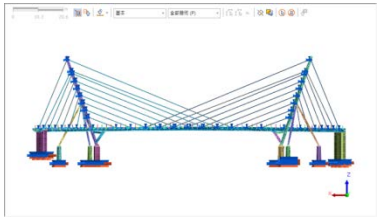
CAE邊界條件



風壓
(由CFD計算得到)



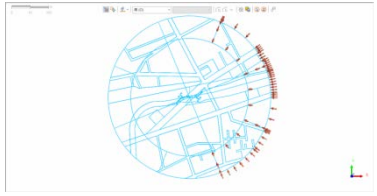
活載重

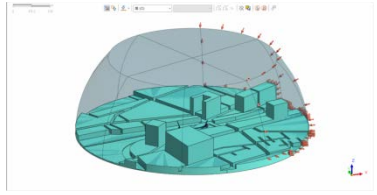


自重

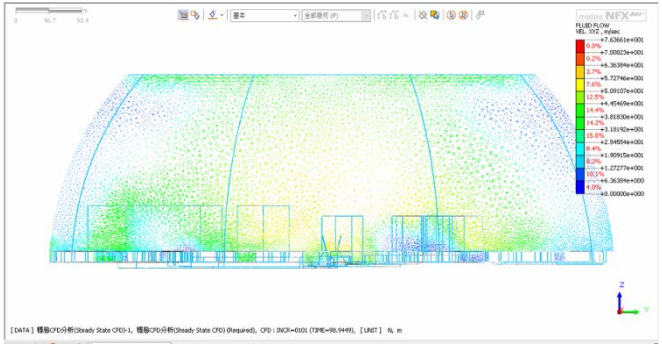
鋼索預力

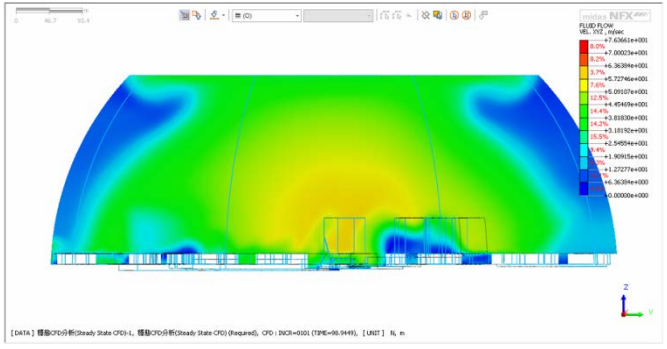
北風-風場分析-9級風



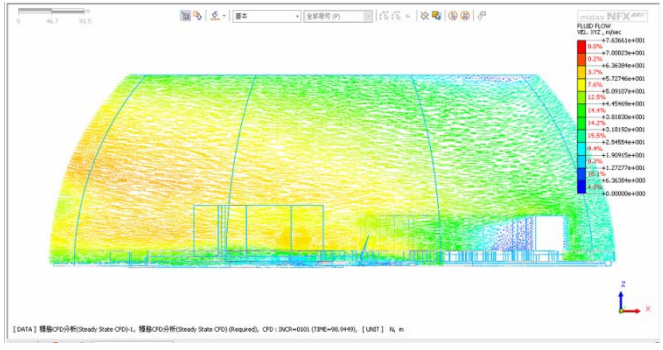


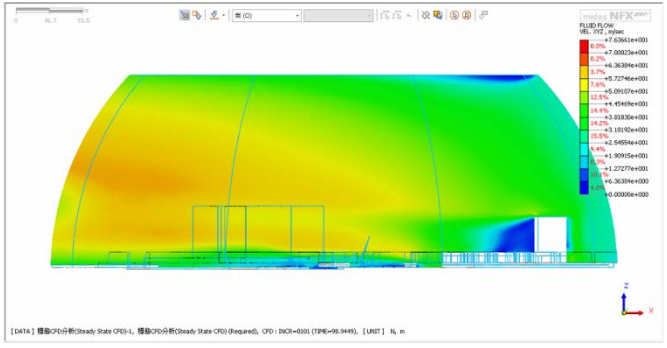
風場方向





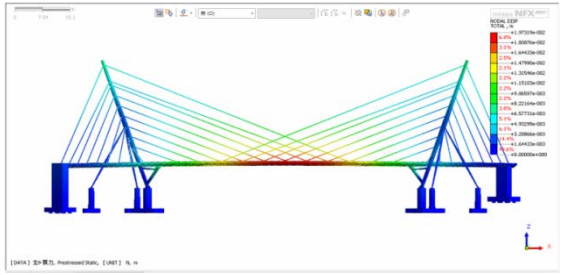
X方向剖面

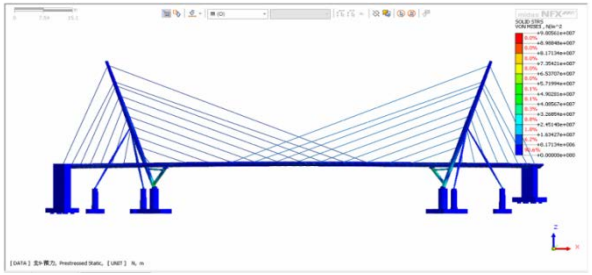


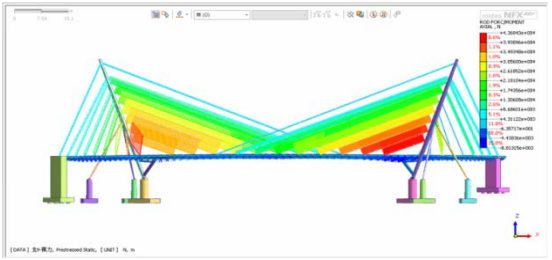


y方向剖面

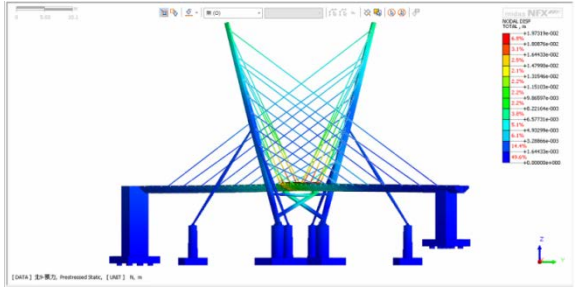
北風-橋體結構強度-9級風



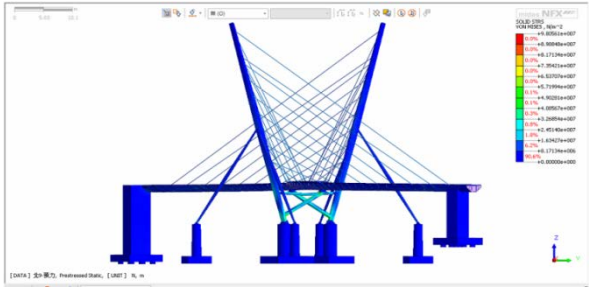




鋼索軸力(N)



橋體變形(mm)



橋體應力(N/m^2)