



Universidad de
Oviedo



ESCUELA POLITÉCNICA DE INGENIERÍA DE GIJÓN

GRADO DE INGENIERÍA DE TECNOLOGÍAS INDUSTRIALES

ÁREA DE MECÁNICA DE FLUIDOS

ANEXO I

AUTOR:

D. LINOS SOUTO, Illán

TUTORES:

D. GARCÍA REGODESEVES, Pedro

D. BARRIO PEROTTI, Raúl

FECHA: JUNIO 2023

ÍNDICE

1. Anexo	5
1.1. Coordenadas del perfil s809	5
1.2. Todos los resultados de las simulaciones.....	6
1.2.1. Caso sin VG.....	6
1.2.2. Caso 1	11
1.2.3. Caso 2	31
1.2.4. Caso 3	51
1.2.5. Caso 4	71

ÍNDICE DE FIGURAS

Figura 1.1. Relación de coordenadas x e y en función de la cuerda (Hand, et al., 2001)	5
Figura 1.2. Contornos de velocidad sin VG a diferentes ángulos de ataque	8
Figura 1.3. Contornos de presión sin VG a diferentes ángulos de ataque	10
Figura 1.4. Contornos de velocidad (vista general) para diferentes ángulos de ataque	13
Figura 1.5. Contornos de velocidad (vista detalle) para diferentes ángulos de ataque	15
Figura 1.6. Contornos de velocidad detrás del VG con un ángulo de ataque de 0 grados	18
Figura 1.7. Contornos de velocidad detrás del VG con un ángulo de ataque de 18 grados	20
Figura 1.8- Contornos de presión (vista general) a diferentes ángulos de ataque	23
Figura 1.9. Contornos de presión (vista detalle) a distintos ángulos de ataque	25
Figura 1.10. Contornos de presión detrás del VG con un ángulo de ataque de 0 grados	28
Figura 1.11. Contornos de presión detrás del VG con un ángulo de ataque de 18 grados	30
Figura 1.12. Contornos de velocidad (vista general) para diferentes ángulos de ataque	33
Figura 1.13. Contornos de velocidad (vista detalle) para diferentes ángulos de ataque	35
Figura 1.14. Contornos de velocidad detrás del VG con un ángulo de ataque de 0 grados	38
Figura 1.15. Contornos de velocidad detrás del VG con un ángulo de ataque de 18 grados	40
Figura 1.16- Contornos de presión (vista general) a diferentes ángulos de ataque	43
Figura 1.17. Contornos de presión (vista detalle) a distintos ángulos de ataque	45
Figura 1.18. Contornos de presión detrás del VG con un ángulo de ataque de 0 grados	48
Figura 1.19. Contornos de presión detrás del VG con un ángulo de ataque de 18 grados	50
Figura 1.20. Contornos de velocidad (vista general) para diferentes ángulos de ataque	53
Figura 1.21. Contornos de velocidad (vista detalle) para diferentes ángulos de ataque	55
Figura 1.22. Contornos de velocidad detrás del VG con un ángulo de ataque de 0 grados	58
Figura 1.23. Contornos de velocidad detrás del VG con un ángulo de ataque de 18 grados	60
Figura 1.24- Contornos de presión (vista general) a diferentes ángulos de ataque	63
Figura 1.25. Contornos de presión (vista detalle) a distintos ángulos de ataque	65
Figura 1.26. Contornos de presión detrás del VG con un ángulo de ataque de 0 grados	68
Figura 1.27. Contornos de presión detrás del VG con un ángulo de ataque de 18 grados	70
Figura 1.28. Contornos de velocidad (vista general) para diferentes ángulos de ataque	73
Figura 1.29. Contornos de velocidad (vista detalle) para diferentes ángulos de ataque	75
Figura 1.30. Contornos de velocidad detrás del VG con un ángulo de ataque de 0 grados	78
Figura 1.31. Contornos de velocidad detrás del VG con un ángulo de ataque de 18 grados	80
Figura 1.32- Contornos de presión (vista general) a diferentes ángulos de ataque	83
Figura 1.33. Contornos de presión (vista detalle) a distintos ángulos de ataque	85

Figura 1.34. Contornos de presión detrás del VG con un ángulo de ataque de 0 grados _____ 88

Figura 1.35. Contornos de presión detrás del VG con un ángulo de ataque de 18 grados _____ 90

1. Anexo

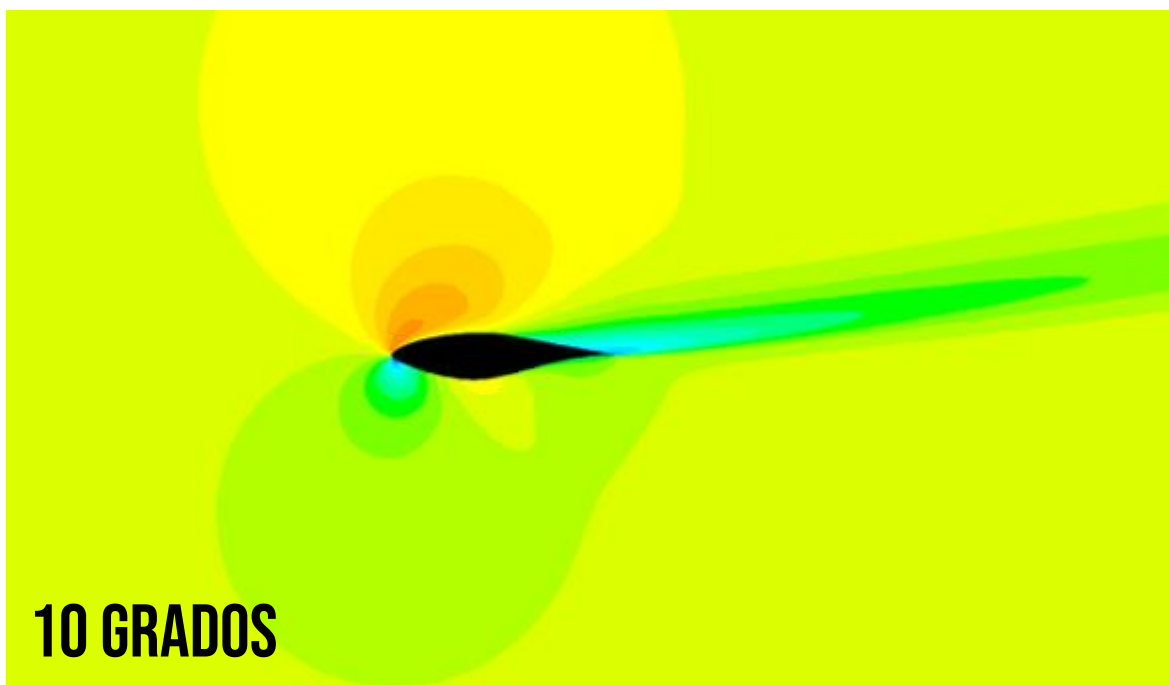
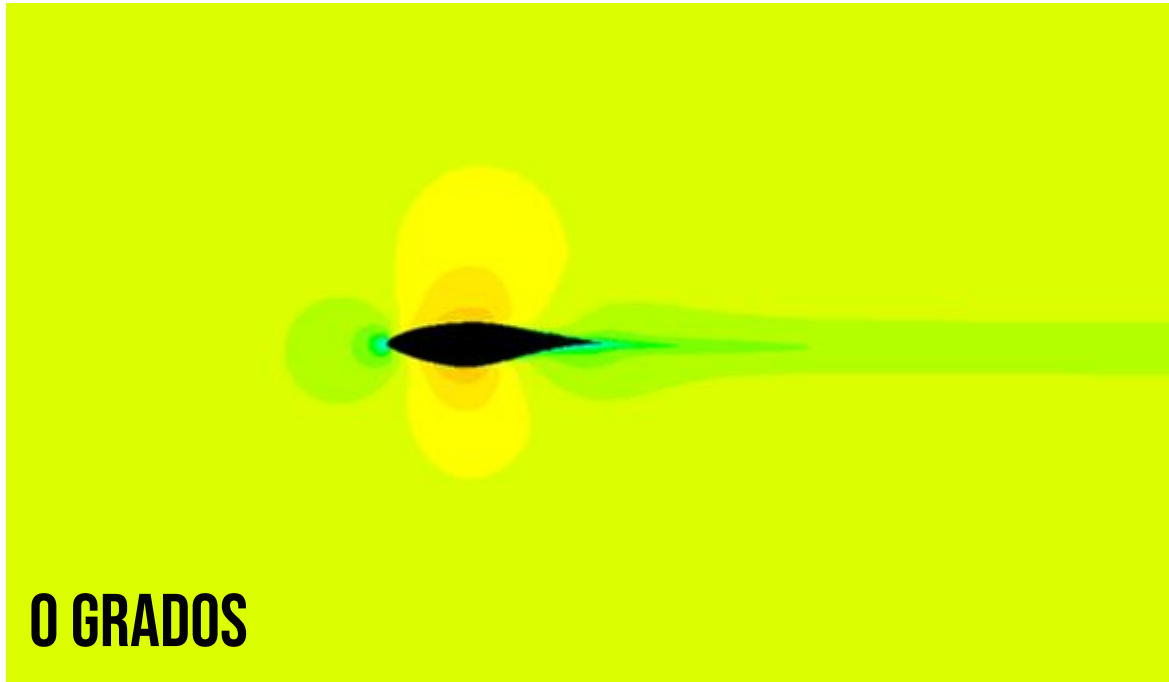
1.1. Coordenadas del perfil s809

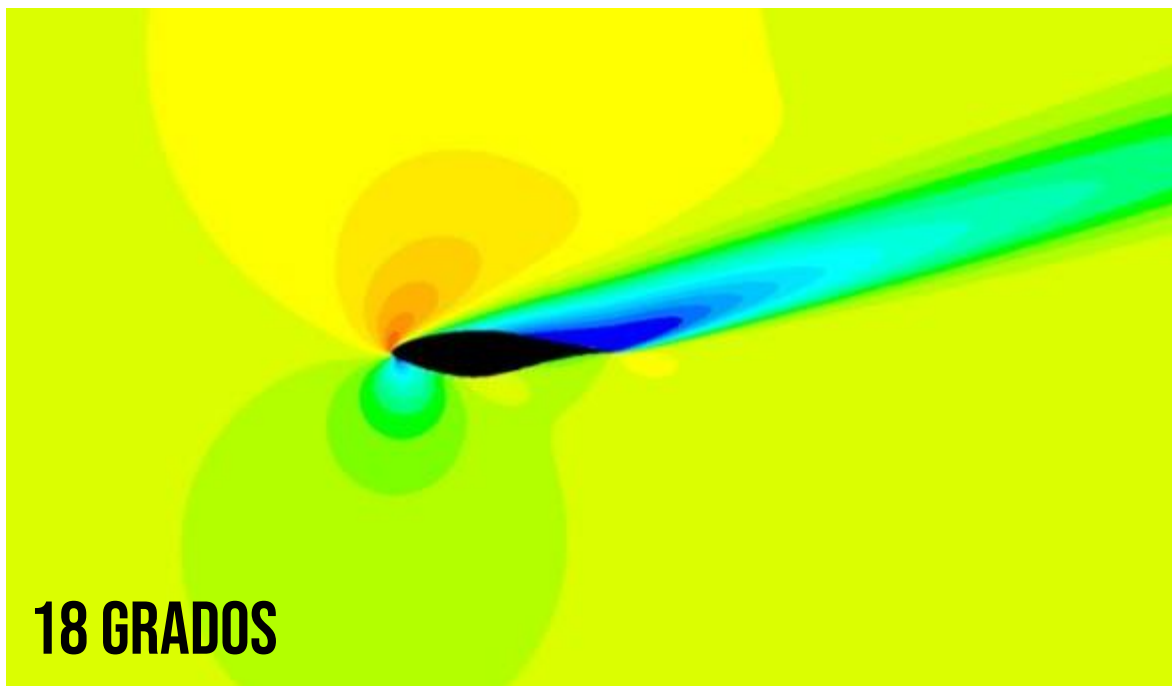
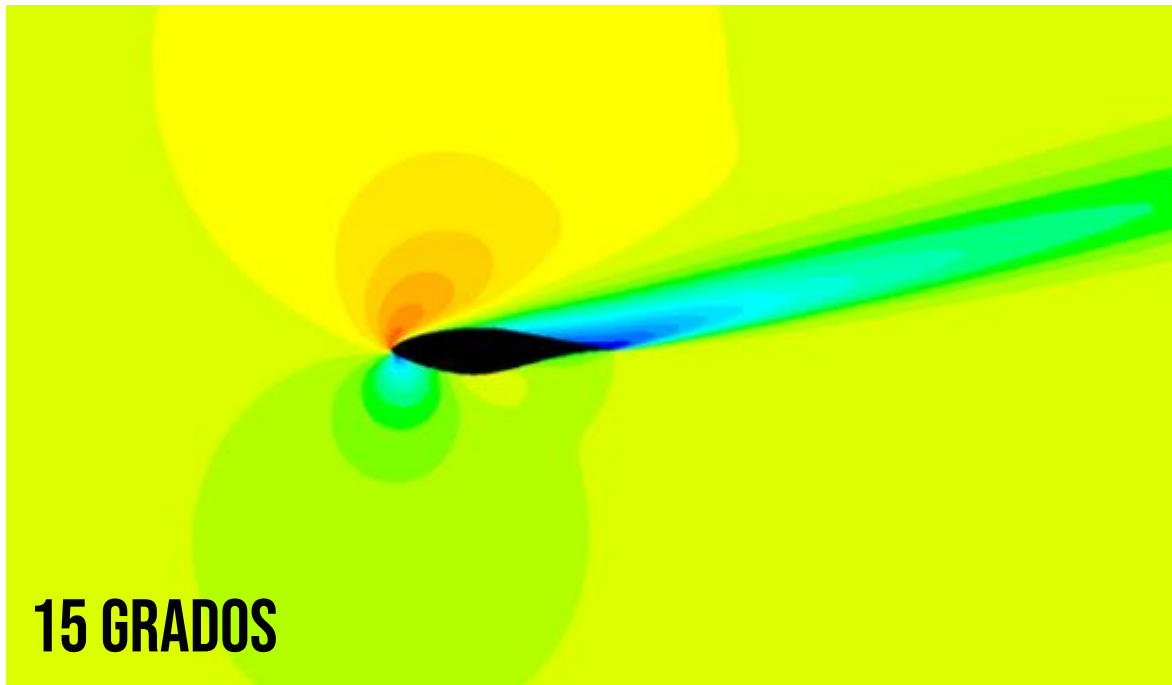
Upper Surface		Lower Surface	
x/c	y/c	x/c	y/c
0.00037	0.00275	0.00140	-0.00498
0.00575	0.01166	0.00933	-0.01272
0.01626	0.02133	0.02321	-0.02162
0.03158	0.03136	0.04223	-0.03144
0.05147	0.04143	0.06579	-0.04199
0.07568	0.05132	0.09325	-0.05301
0.10390	0.06082	0.12397	-0.06408
0.13580	0.06972	0.15752	-0.07467
0.17103	0.07786	0.19362	-0.08447
0.20920	0.08505	0.23175	-0.09326
0.24987	0.09113	0.27129	-0.10060
0.29259	0.09594	0.31188	-0.10589
0.33689	0.09933	0.35328	-0.10866
0.38223	0.10109	0.39541	-0.10842
0.42809	0.10101	0.43832	-0.10484
0.47384	0.09843	0.48234	-0.09756
0.52005	0.09237	0.52837	-0.08697
0.56801	0.08356	0.57663	-0.07442
0.61747	0.07379	0.62649	-0.06112
0.66718	0.06403	0.67710	-0.04792
0.71606	0.05462	0.72752	-0.03558
0.76314	0.04578	0.77668	-0.02466
0.80756	0.03761	0.82348	-0.01559
0.84854	0.03017	0.86677	-0.00859
0.88537	0.02335	0.90545	-0.00370
0.91763	0.01694	0.93852	-0.00075
0.94523	0.01101	0.96509	0.00054
0.96799	0.00600	0.98446	0.00065
0.98528	0.00245	0.99612	0.00024
0.99623	0.00054	1.00000	0.00000
1.00000	0.00000	0.00000	0.00000

Figura 1.1. Relación de coordenadas x e y en función de la cuerda (Hand, et al., 2001)

1.2. Todos los resultados de las simulaciones

1.2.1. Caso sin VG





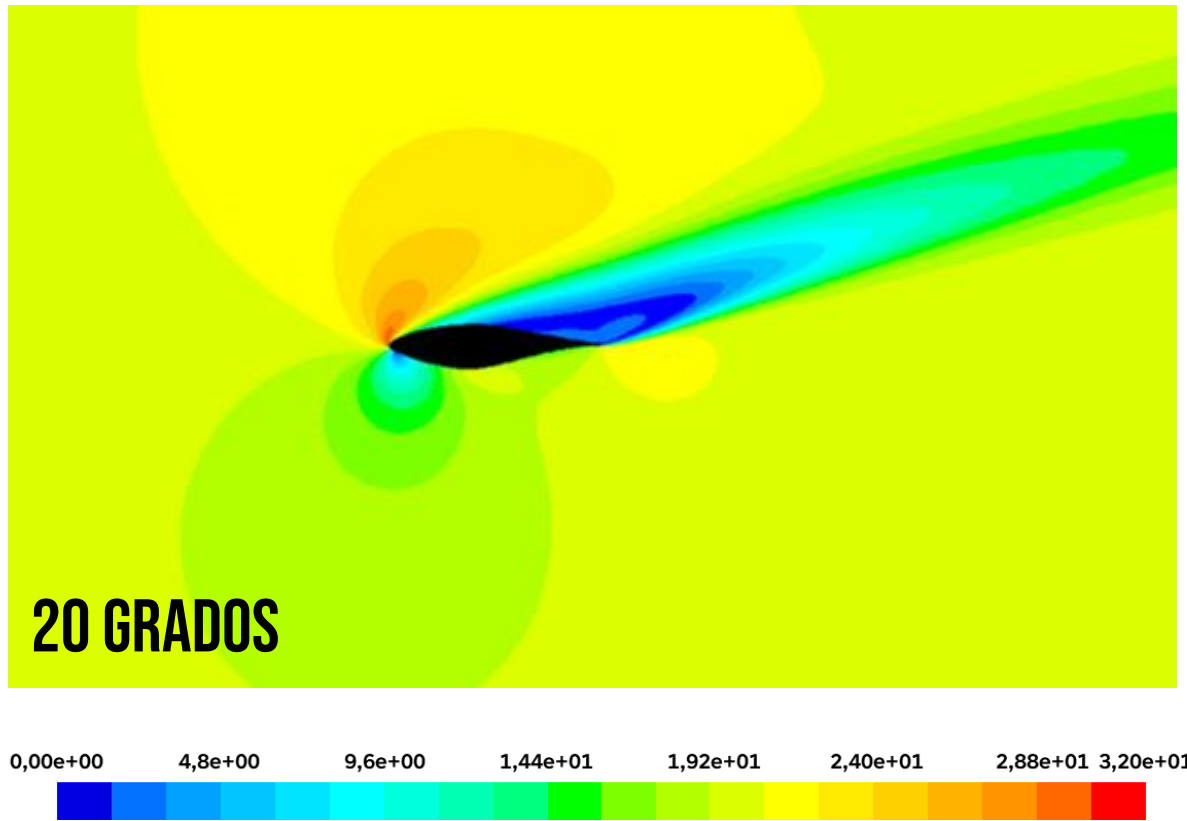
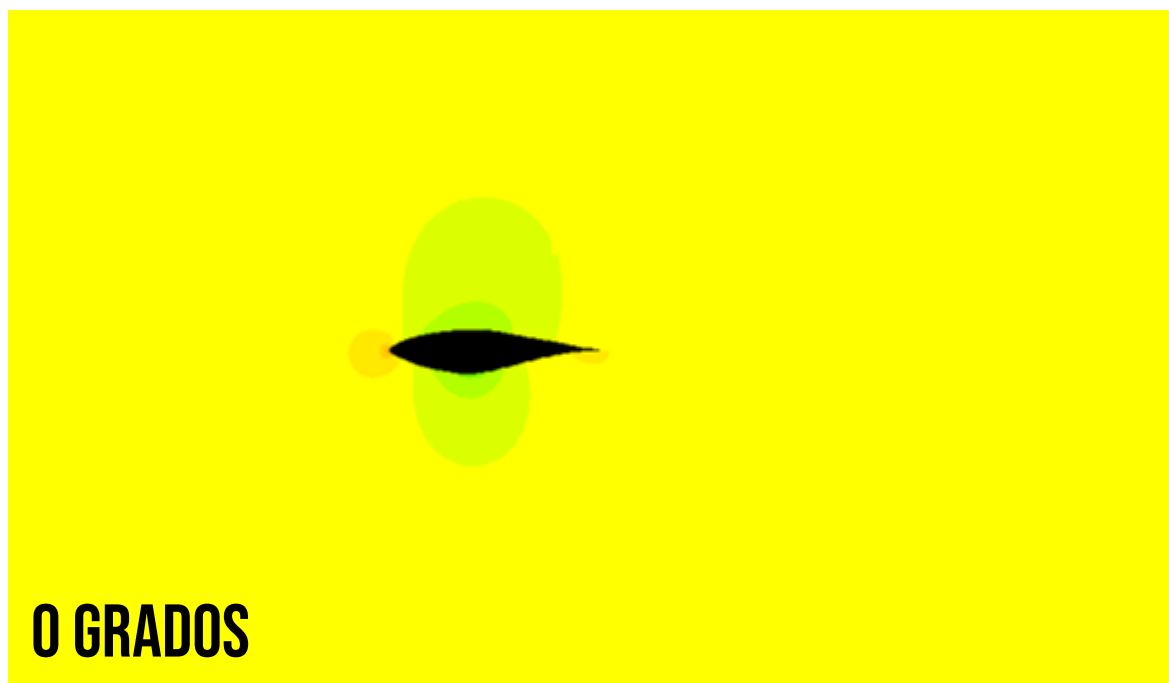
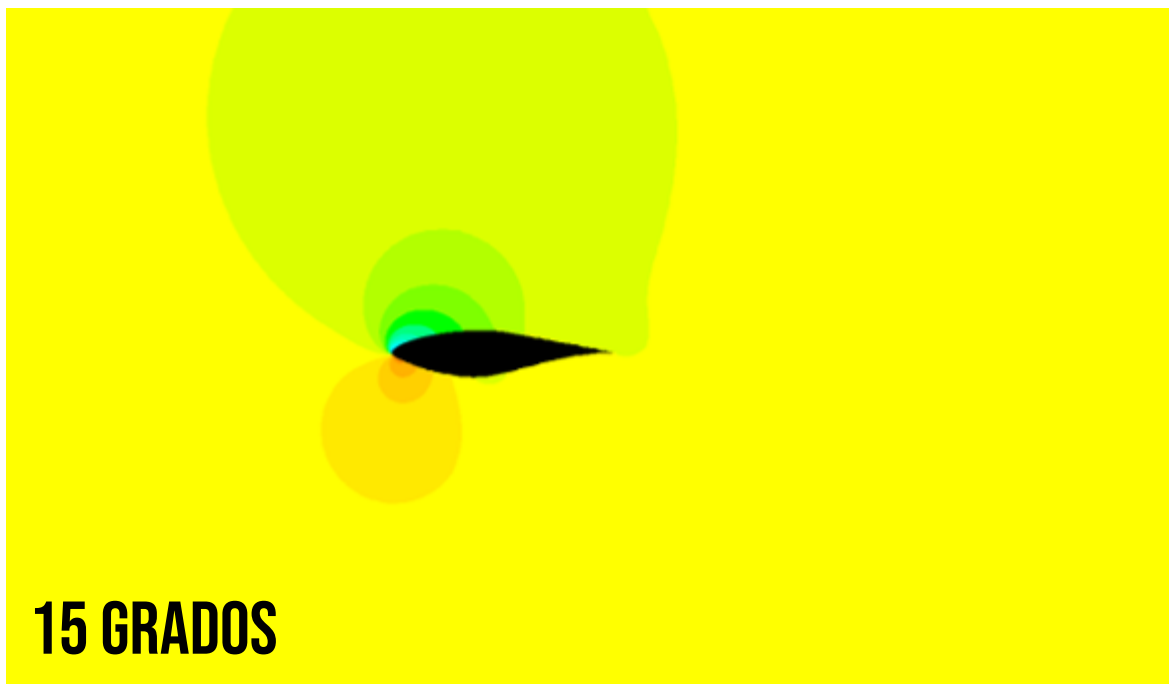
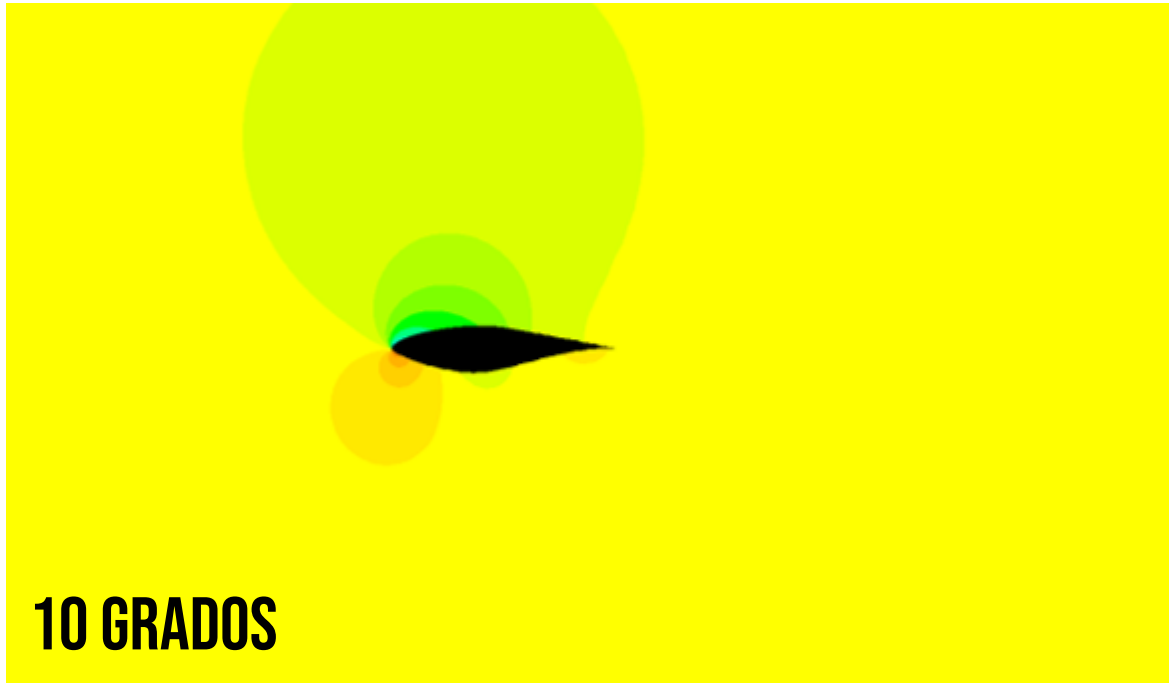


Figura 1.2. Contornos de velocidad sin VG a diferentes ángulos de ataque





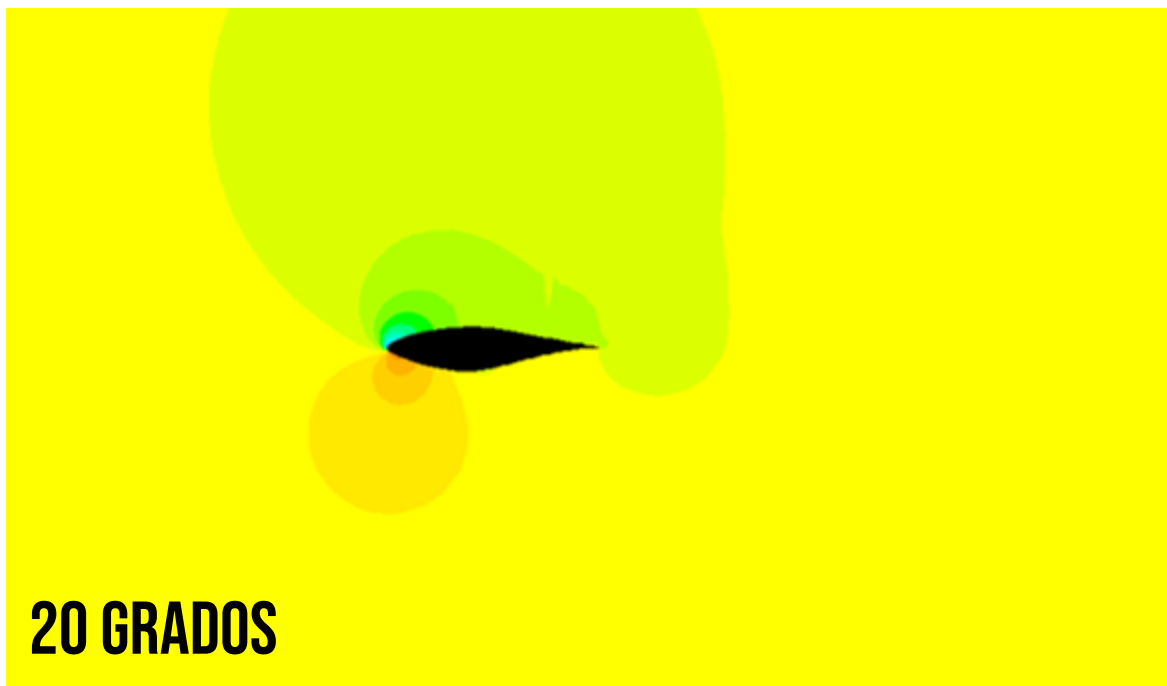
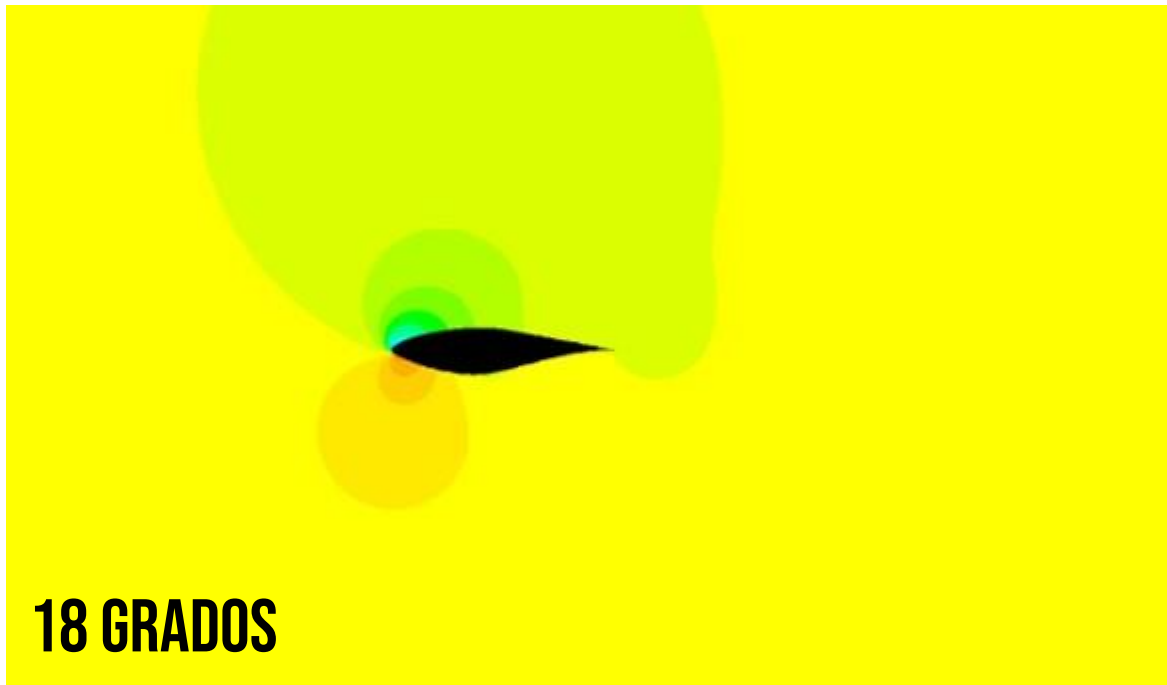
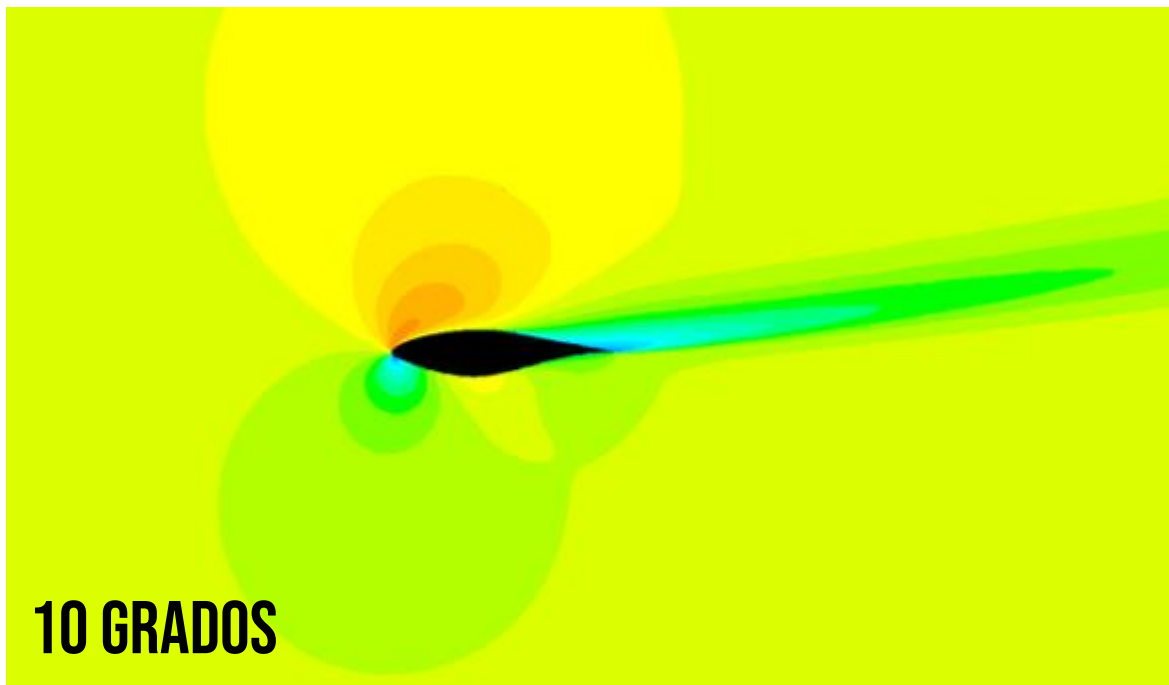
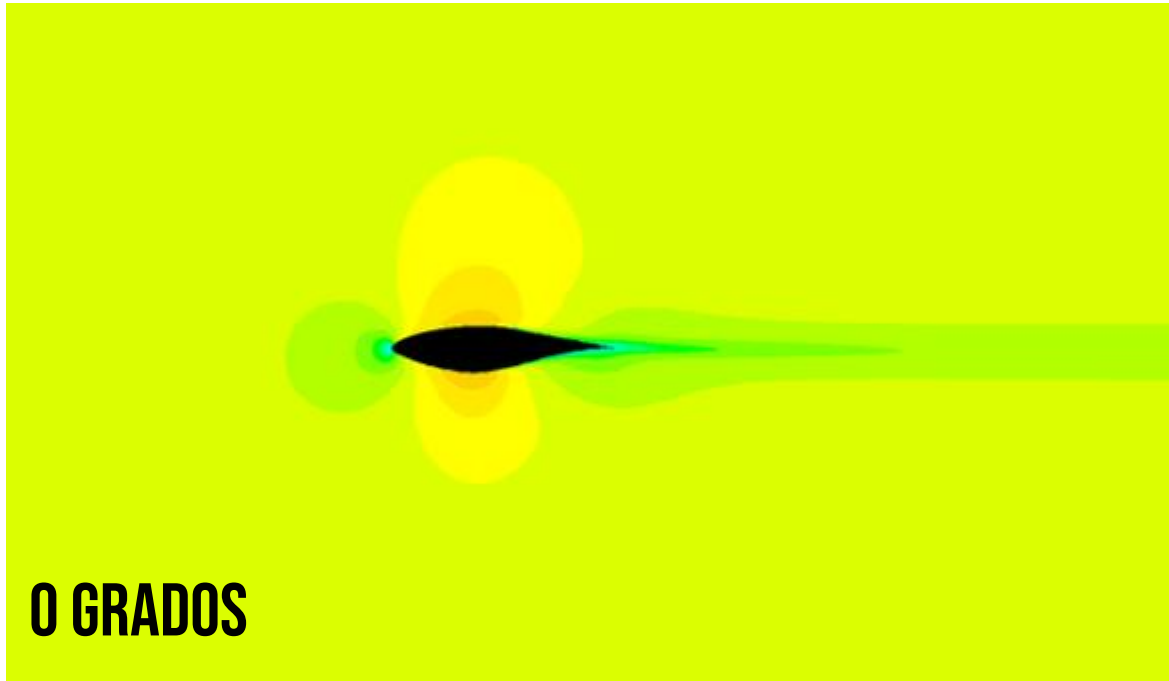
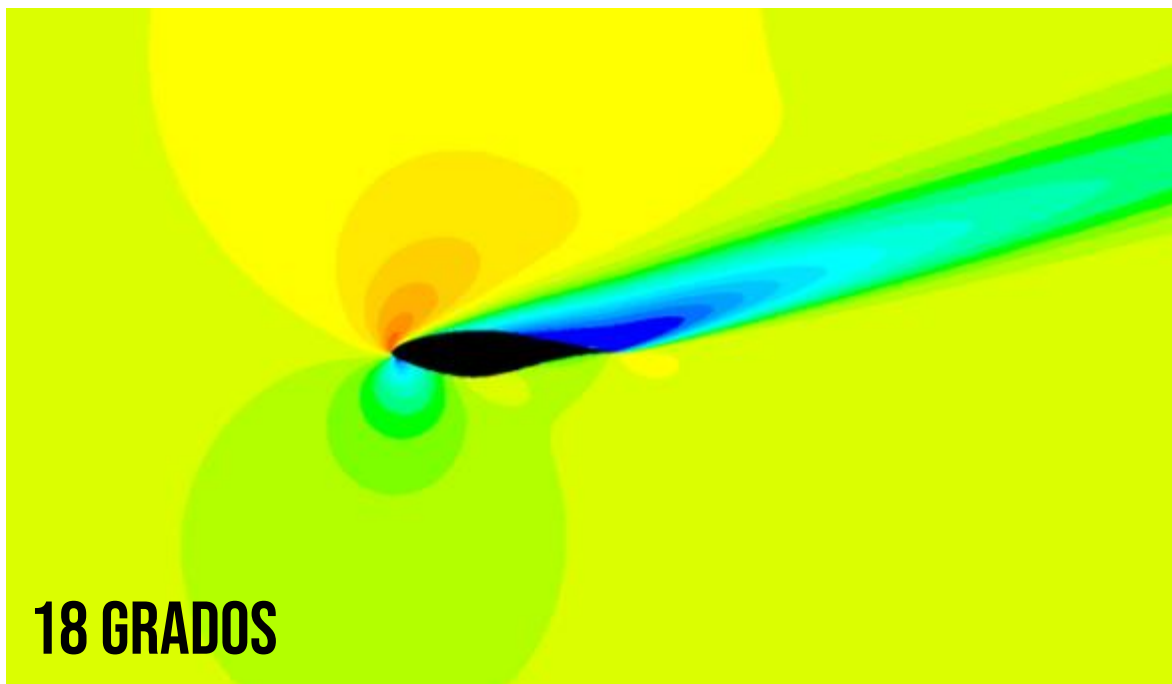
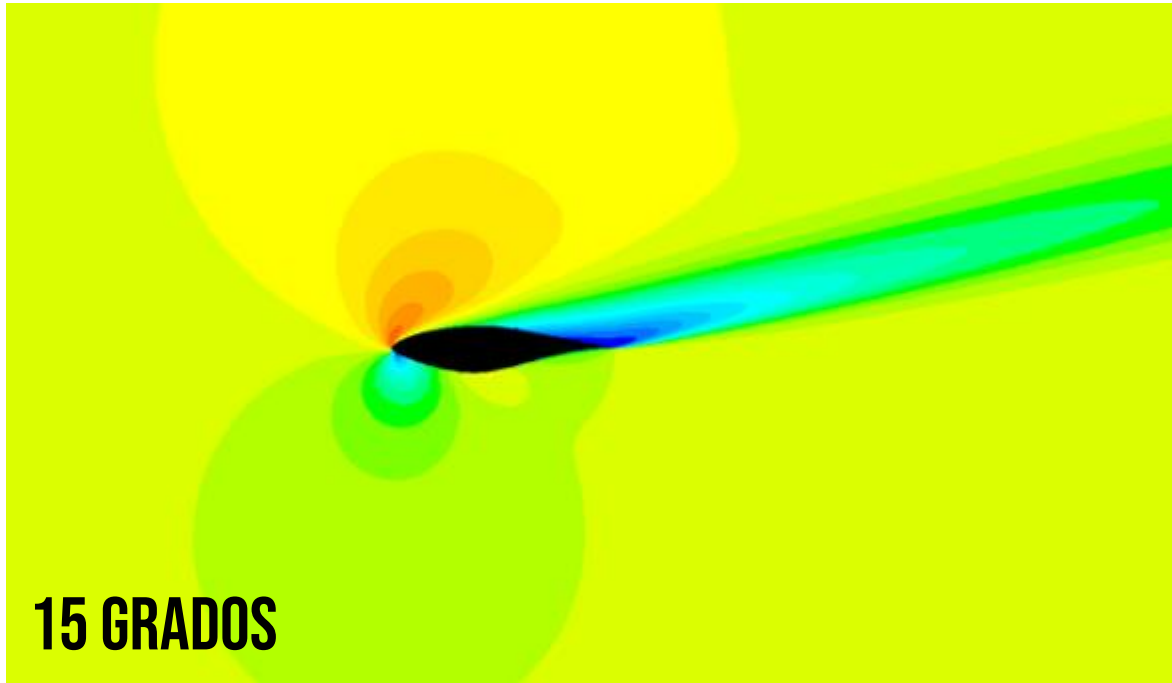


Figura 1.3. Contornos de presión sin VG a diferentes ángulos de ataque

1.2.2. Caso 1





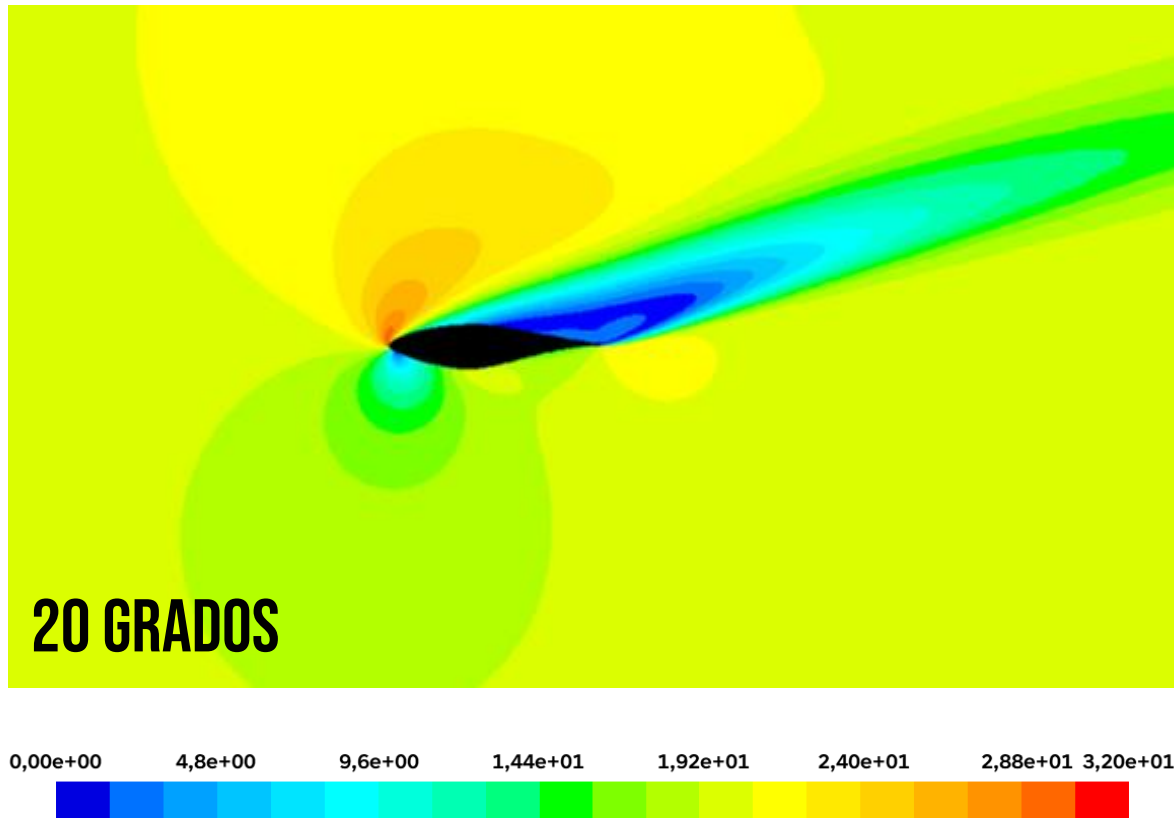
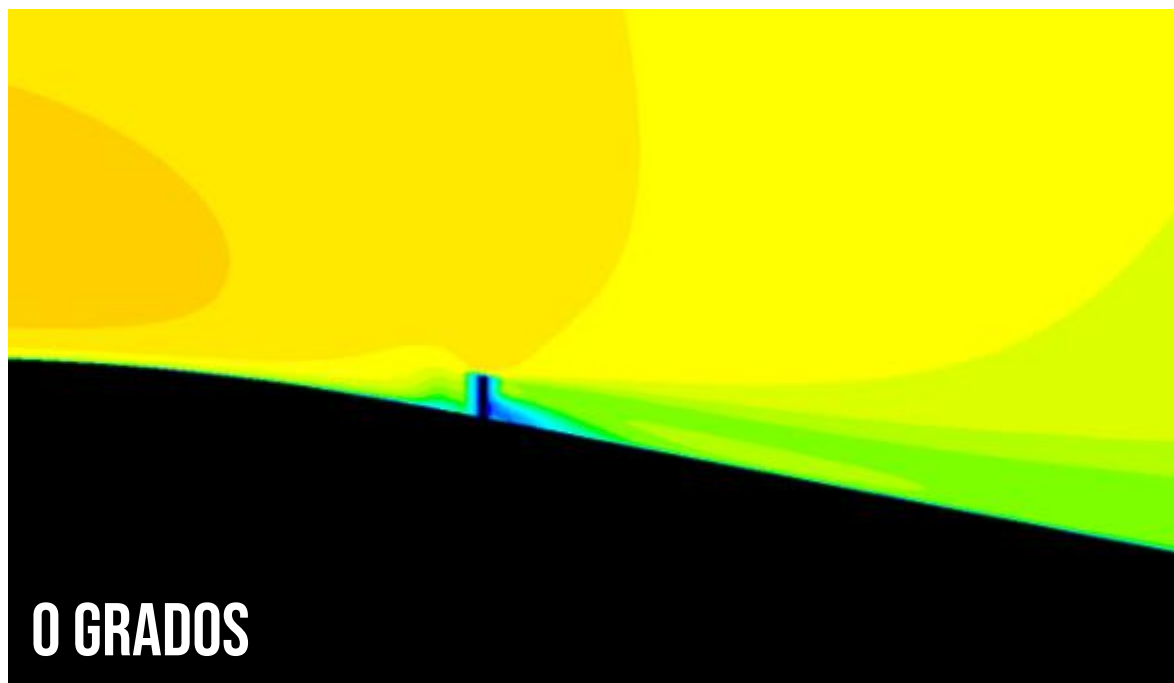
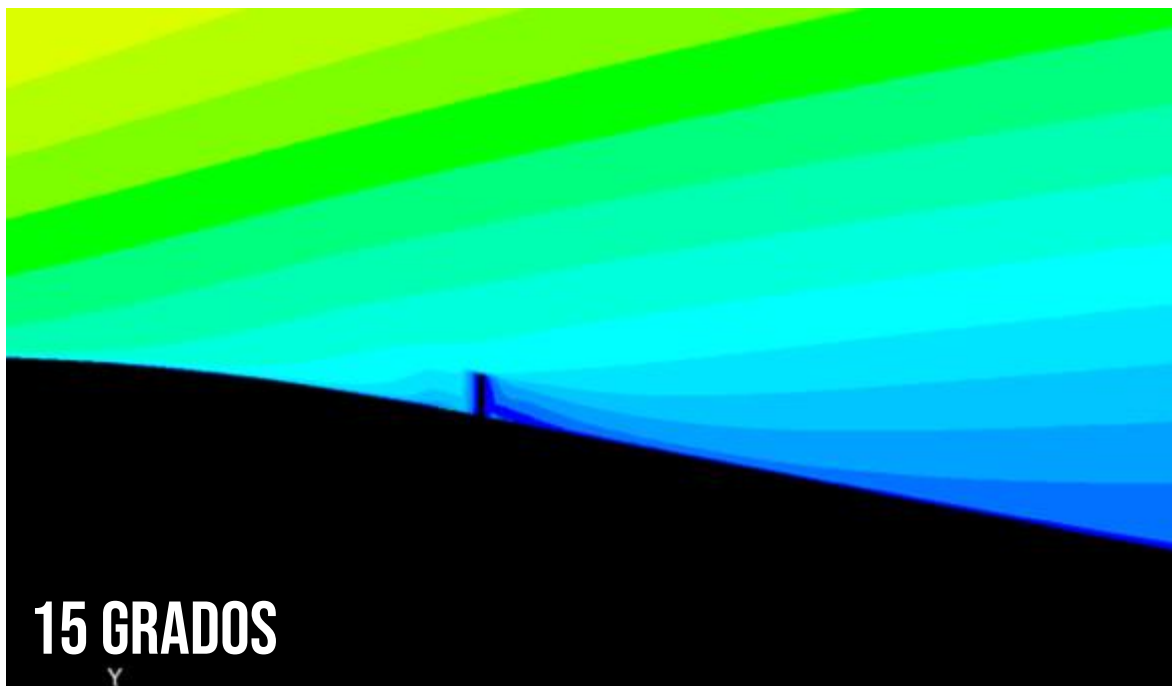
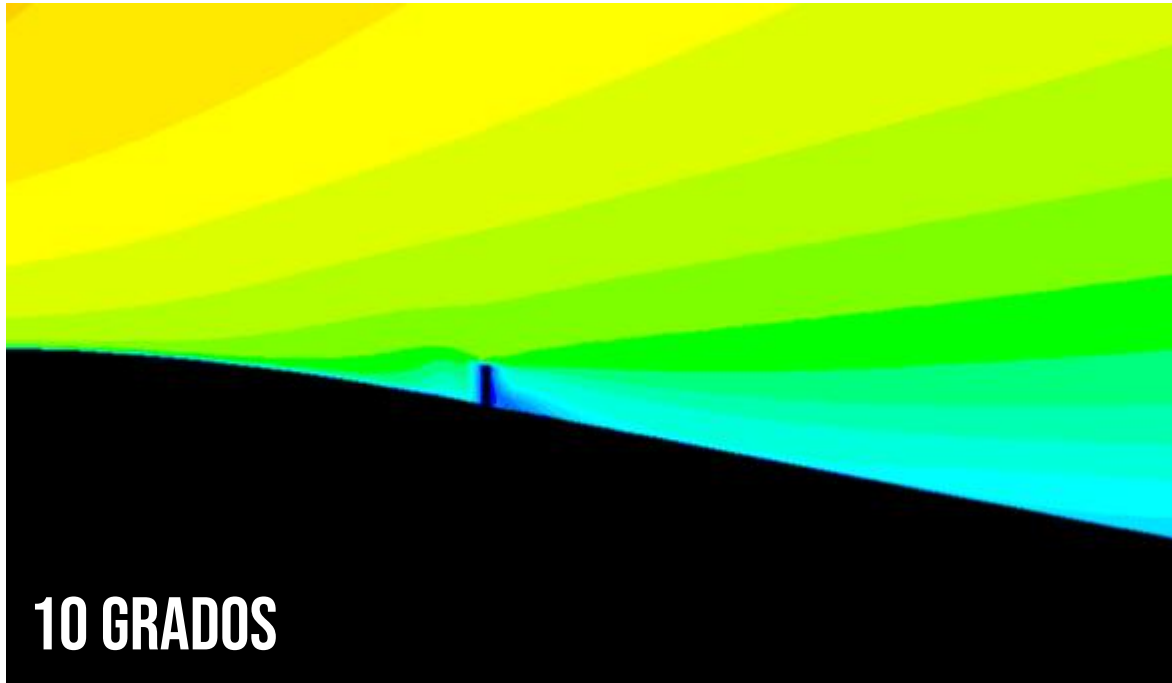


Figura 1.4. Contornos de velocidad (vista general) para diferentes ángulos de ataque





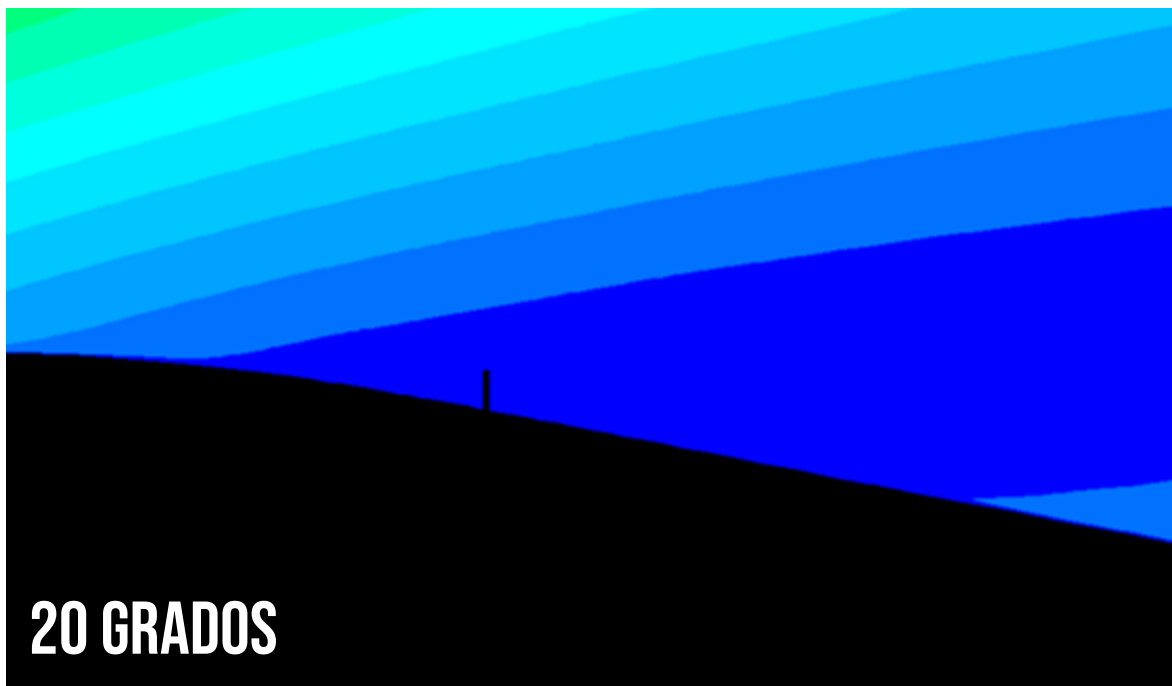
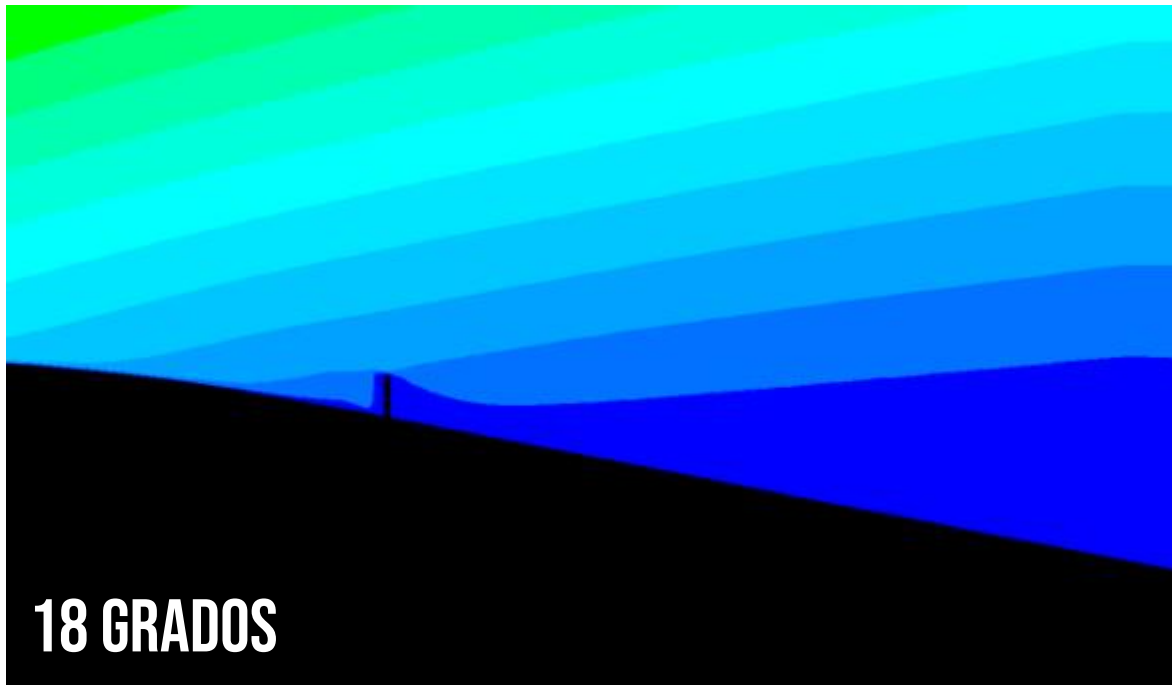
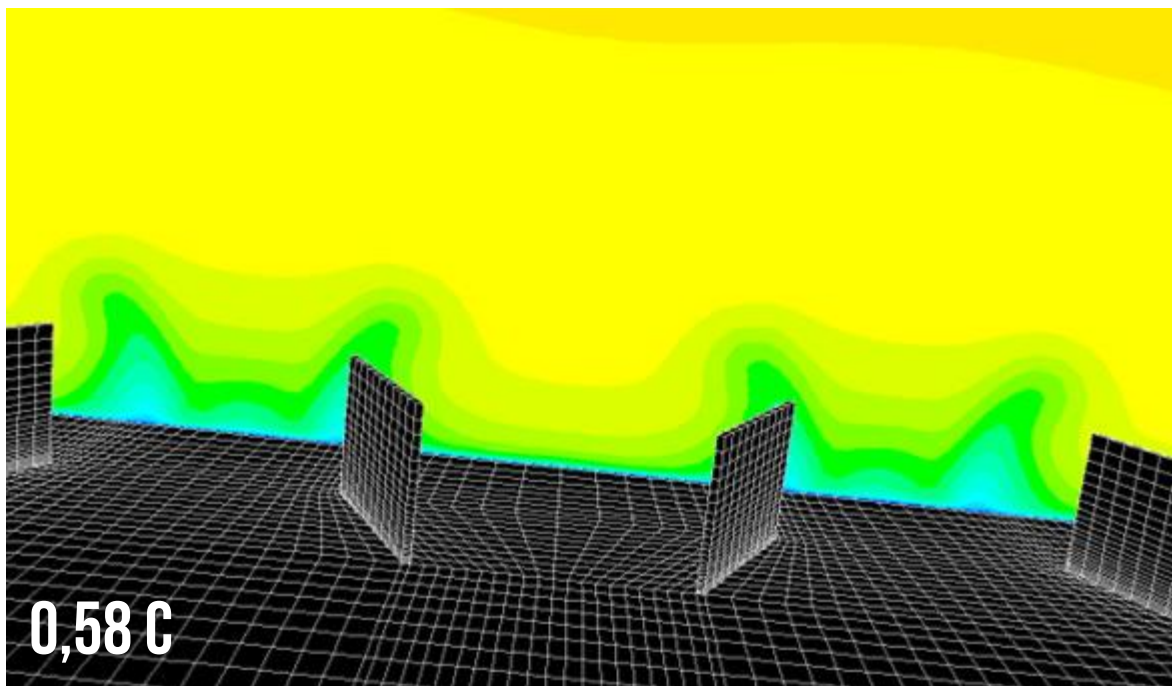
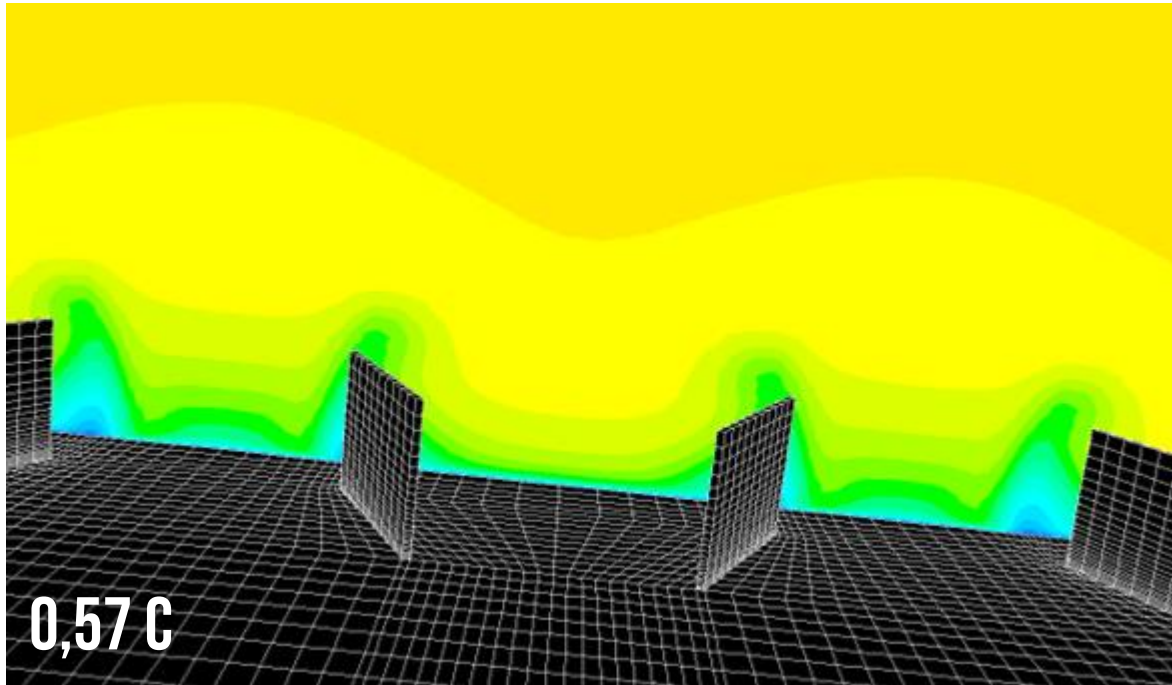
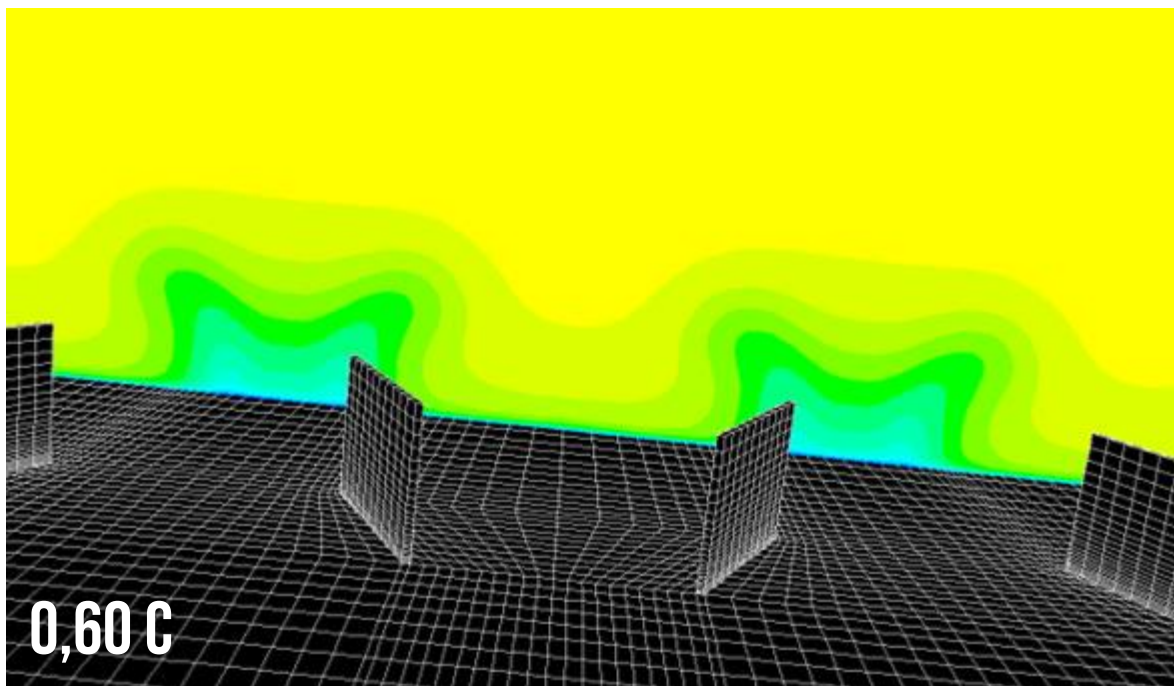
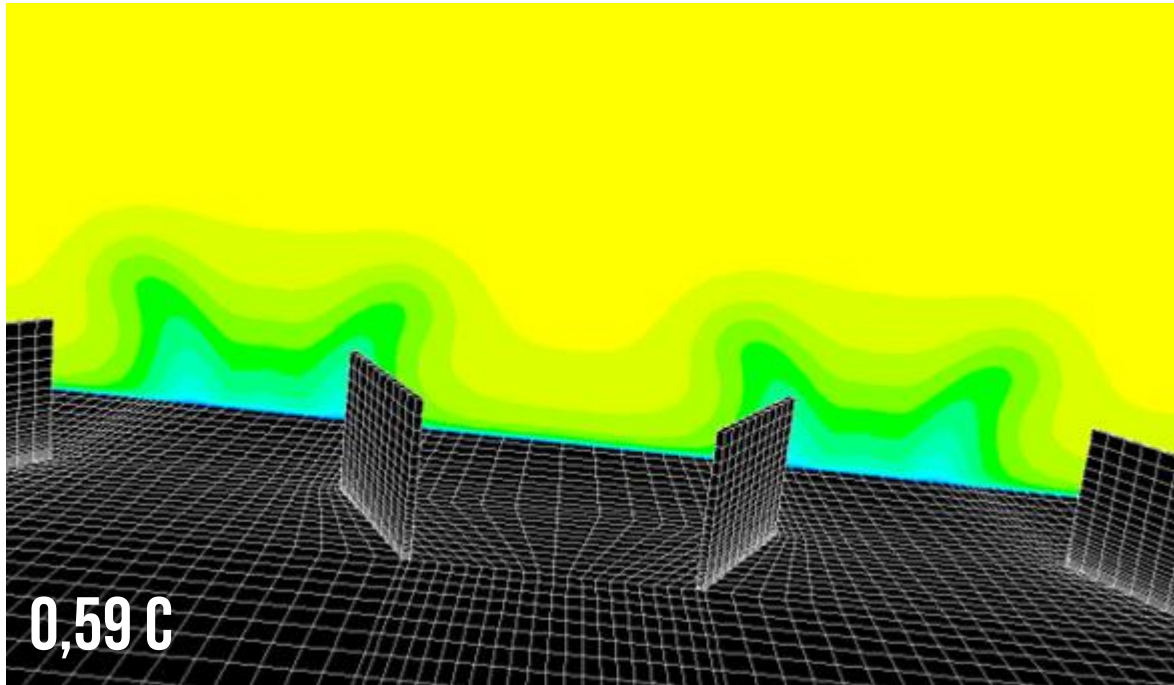


Figura 1.5. Contornos de velocidad (vista detalle) para diferentes ángulos de ataque





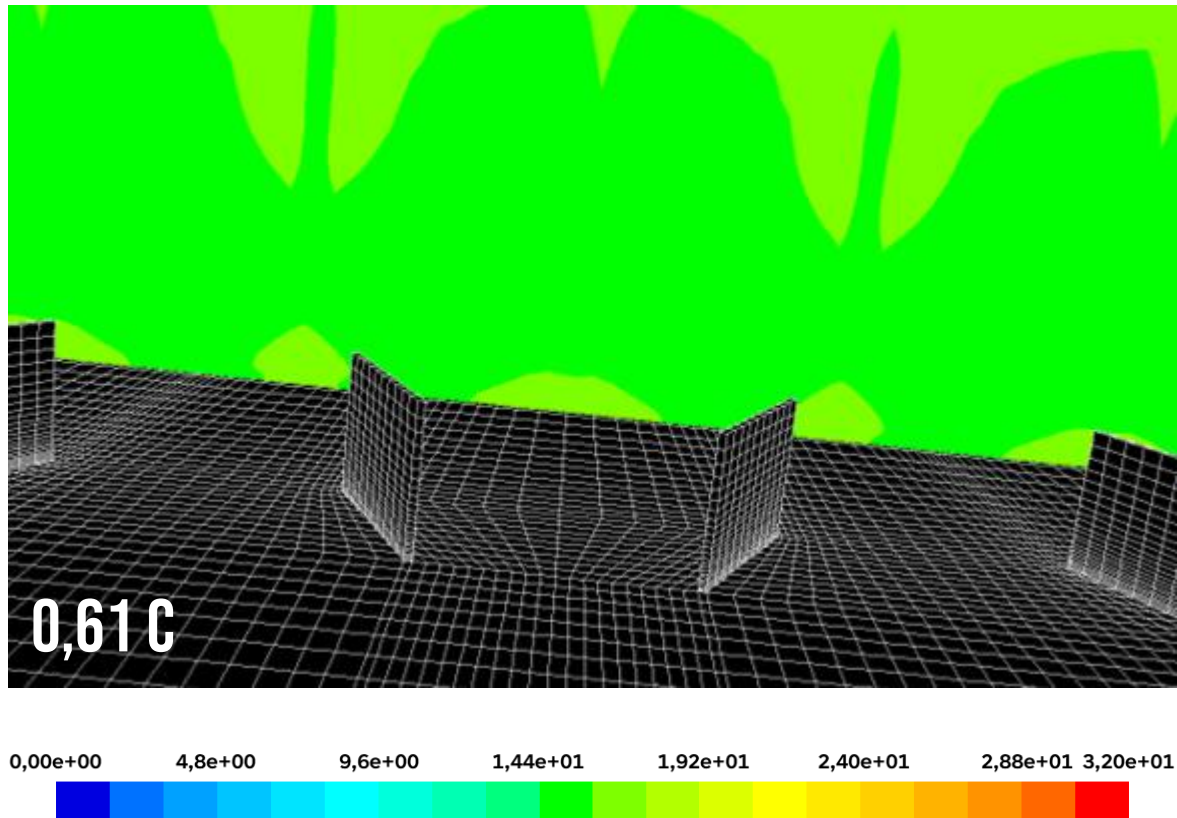
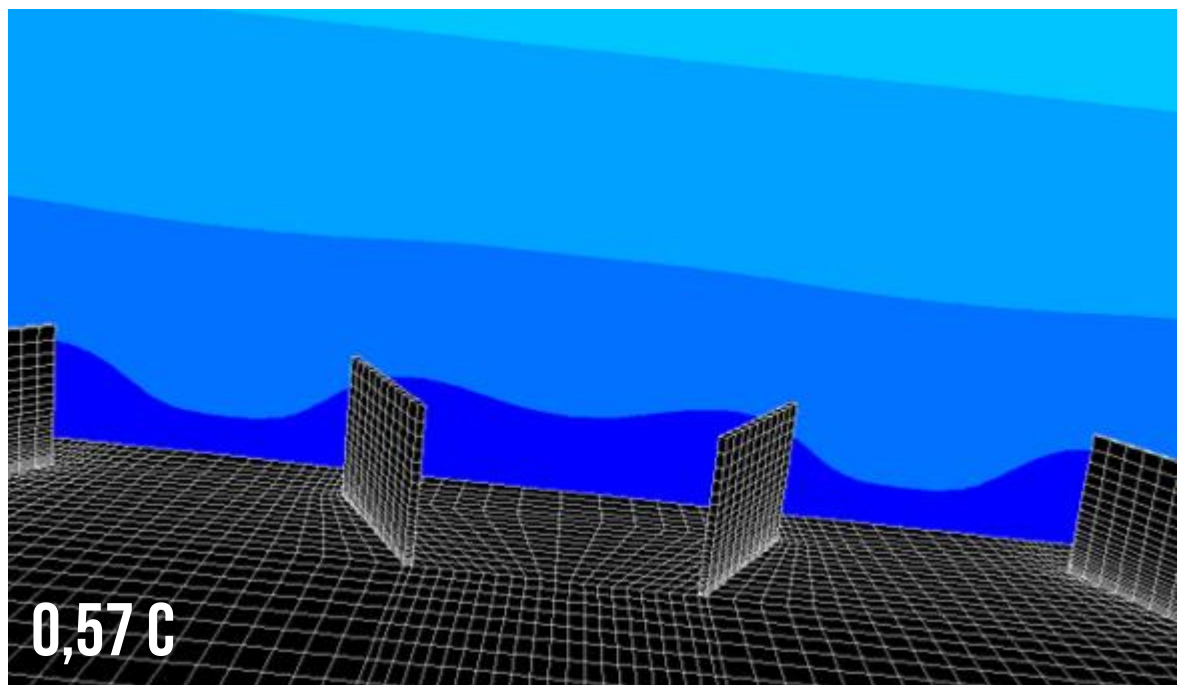
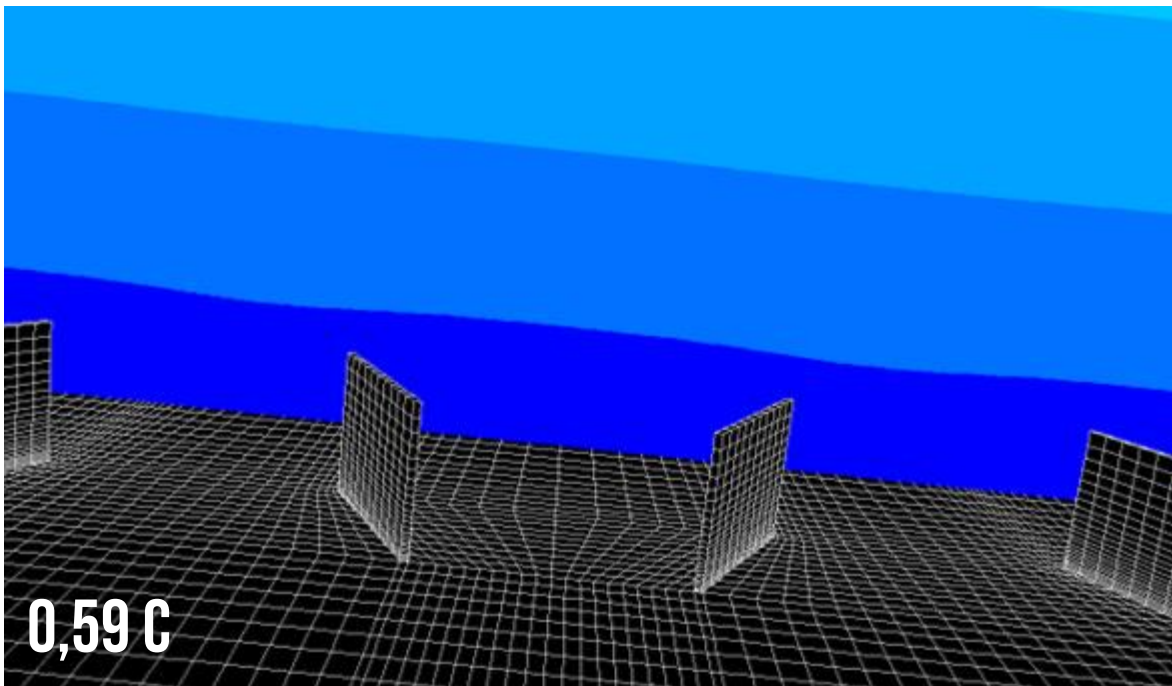
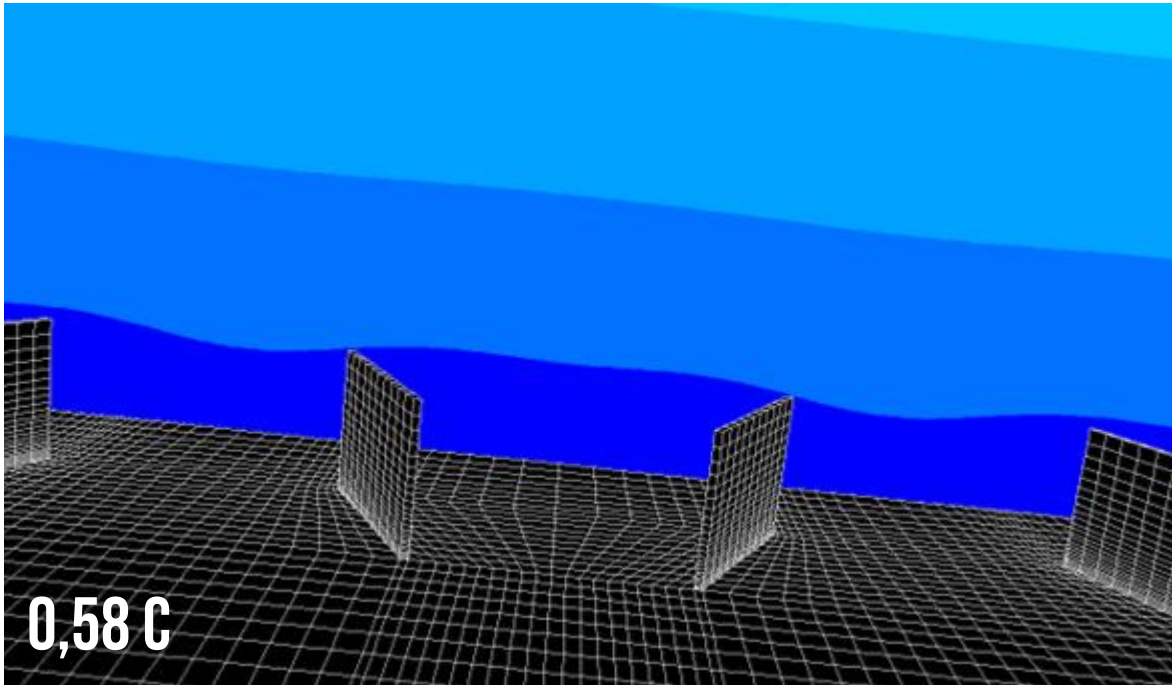


Figura 1.6. Contornos de velocidad detrás del VG con un ángulo de ataque de 0 grados





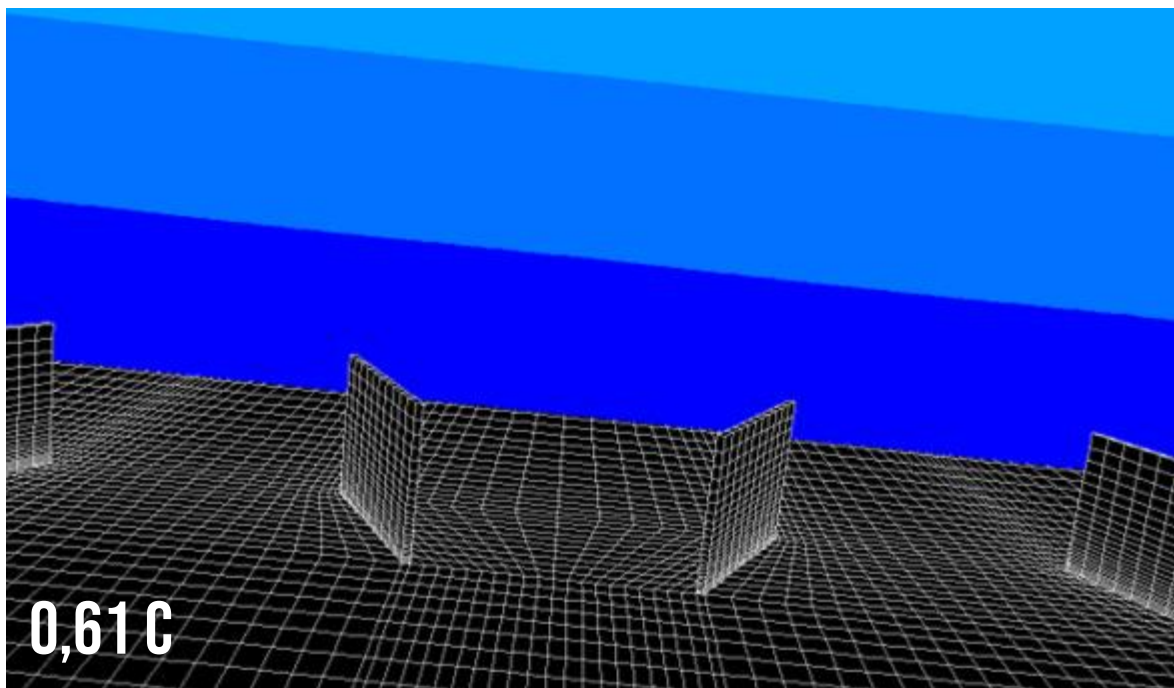
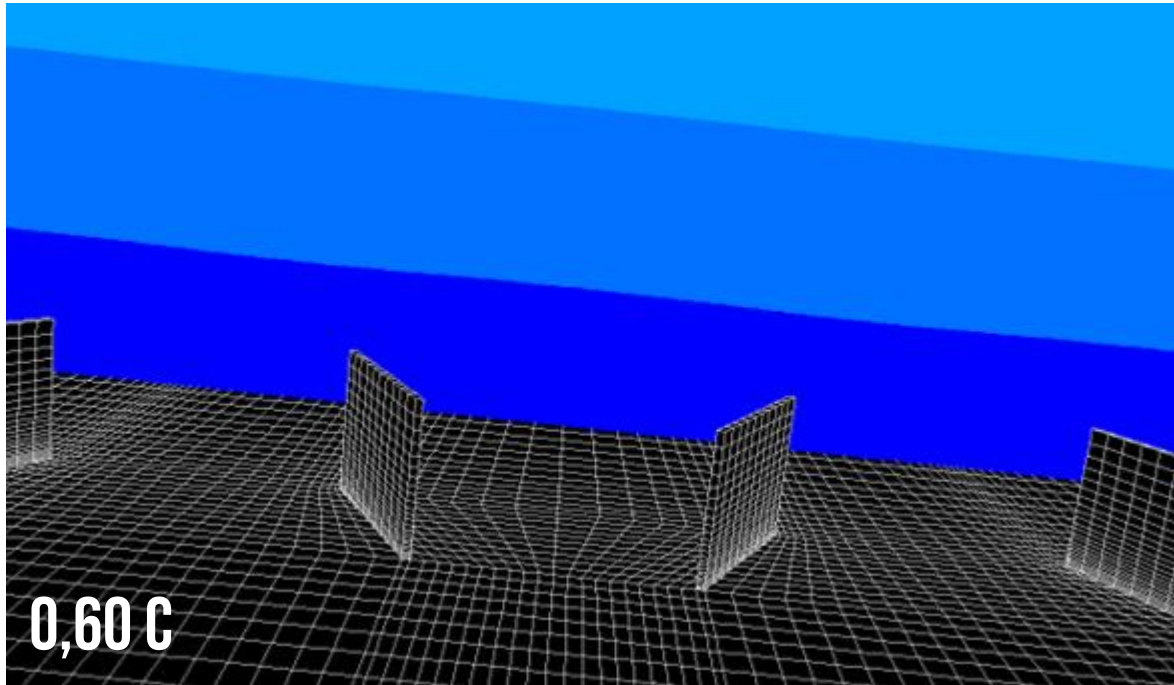
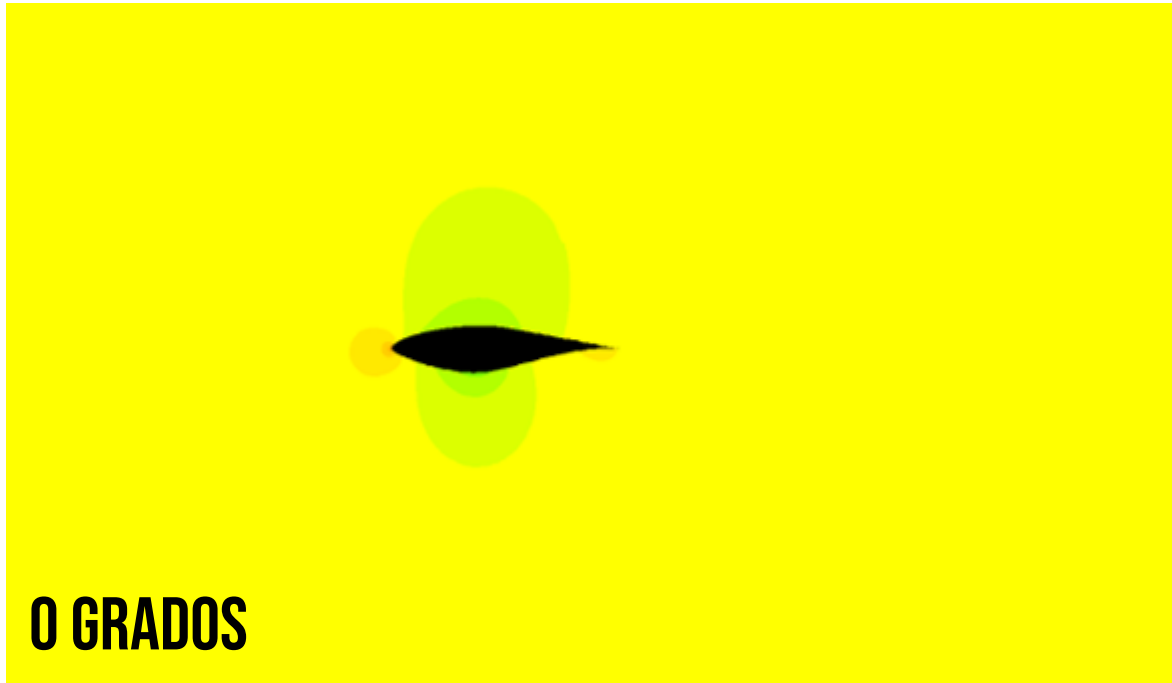
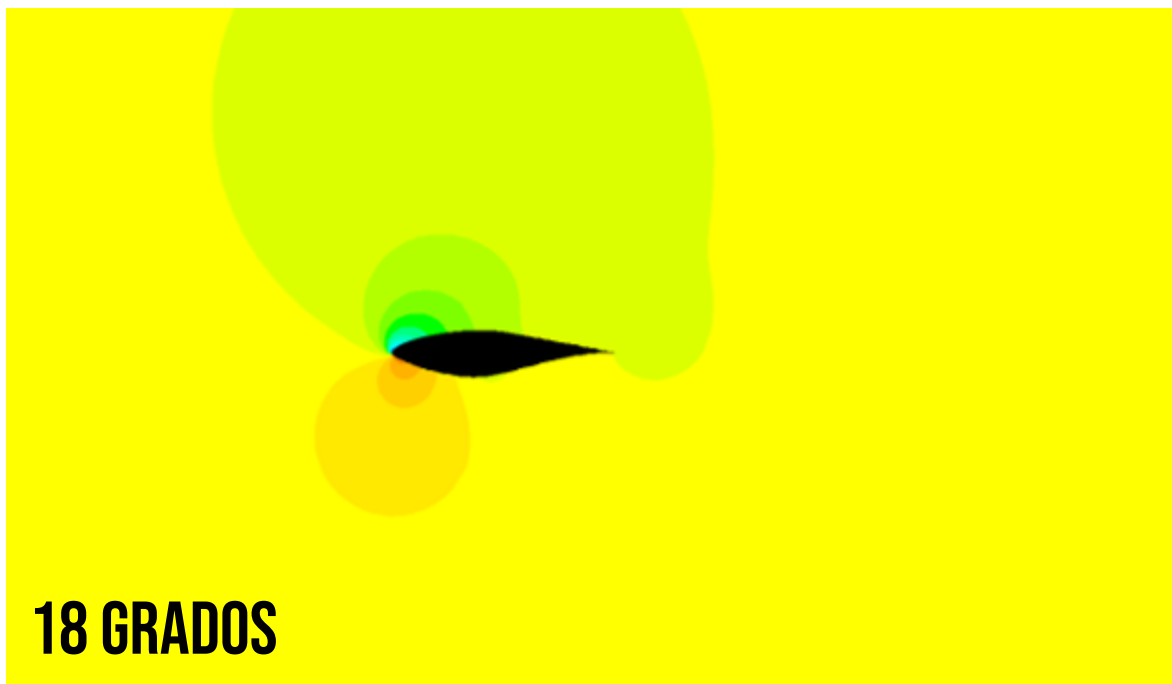
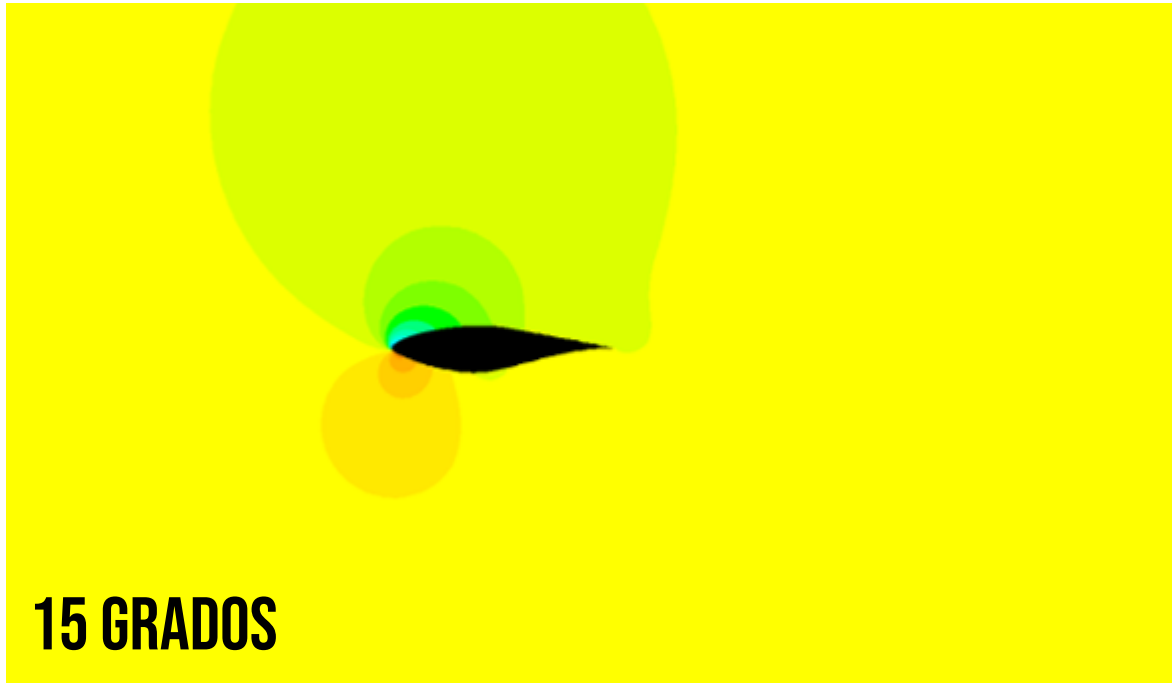


Figura 1.7. Contornos de velocidad detrás del VG con un ángulo de ataque de 18 grados





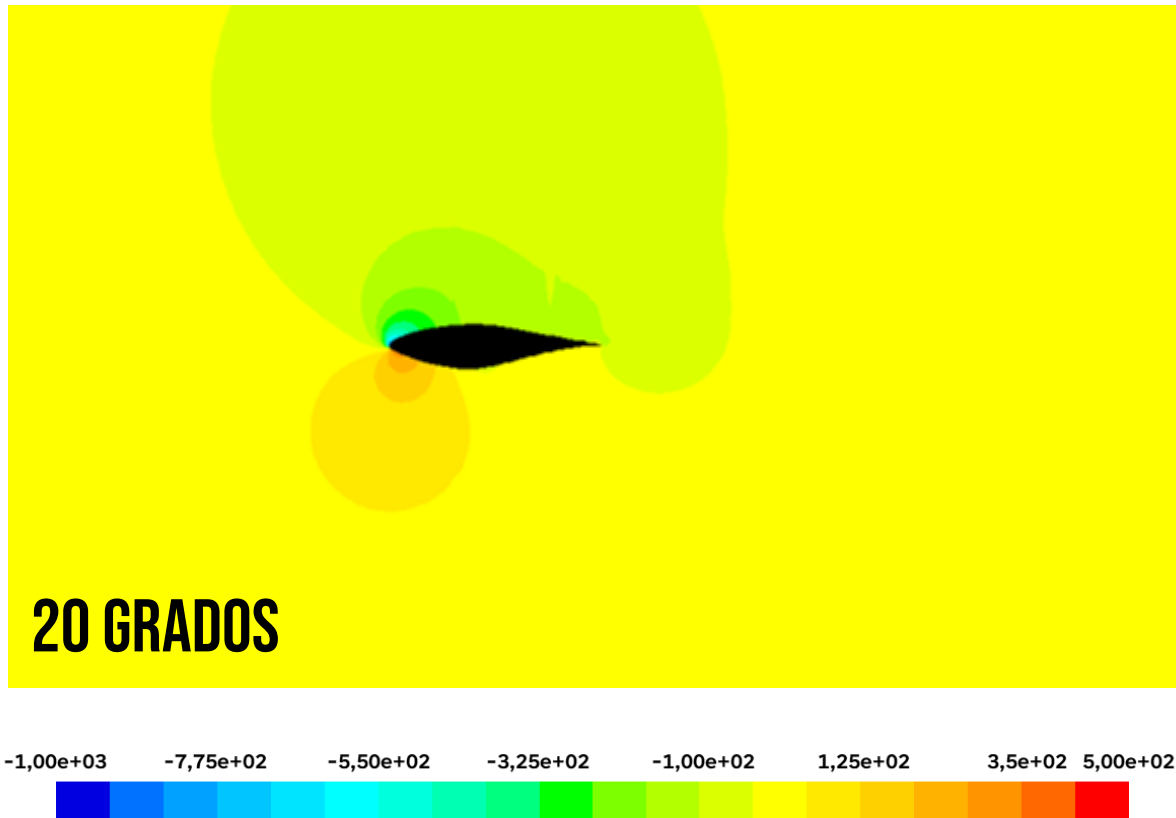
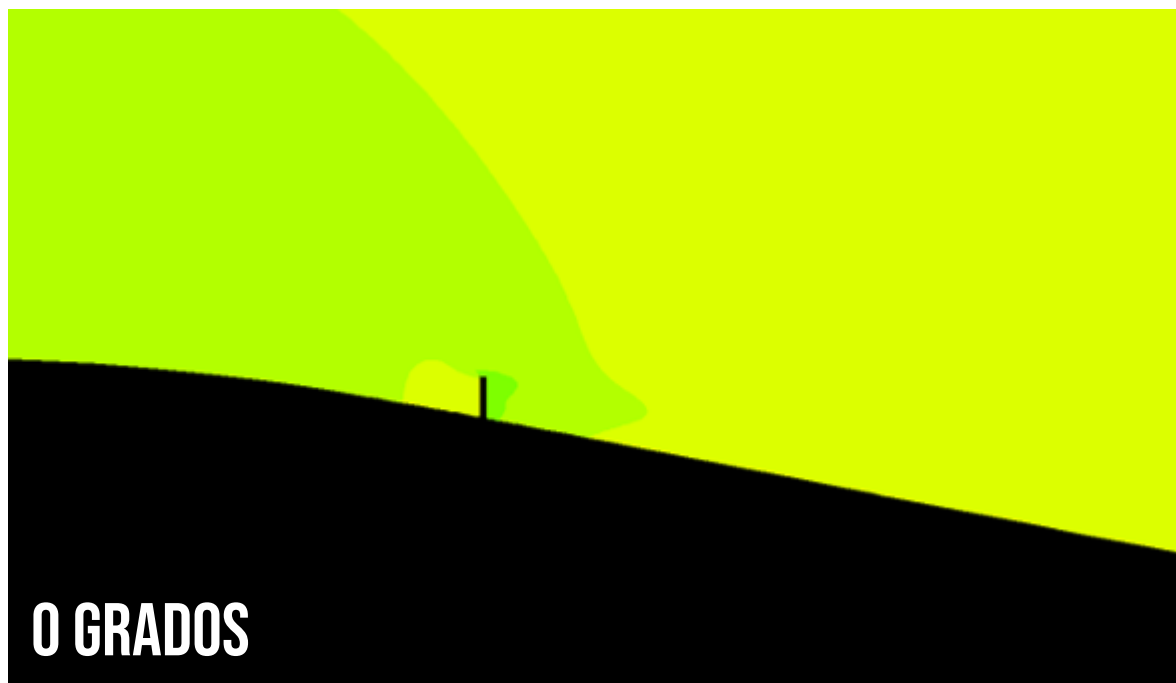
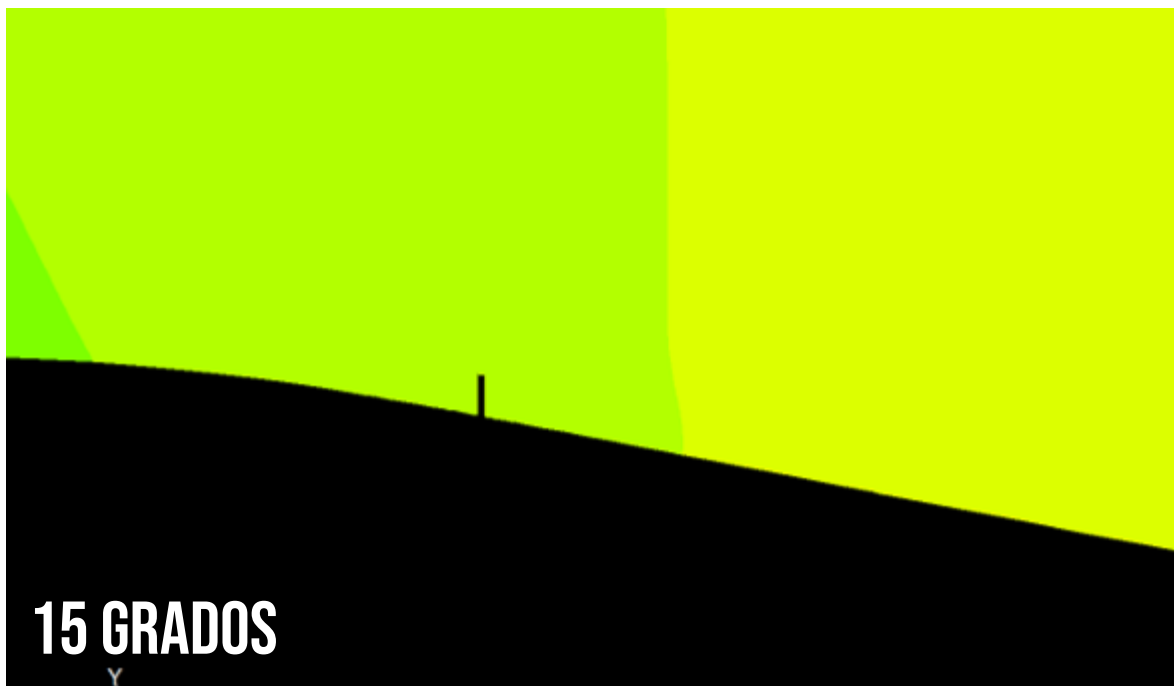
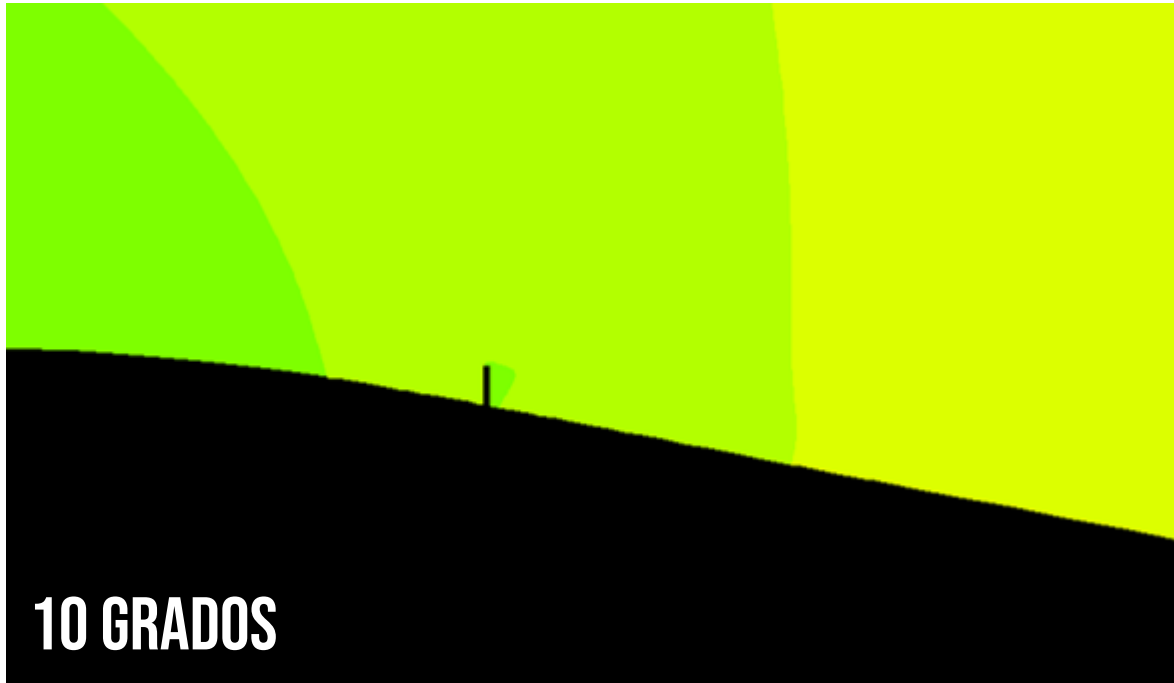


Figura 1.8- Contornos de presión (vista general) a diferentes ángulos de ataque





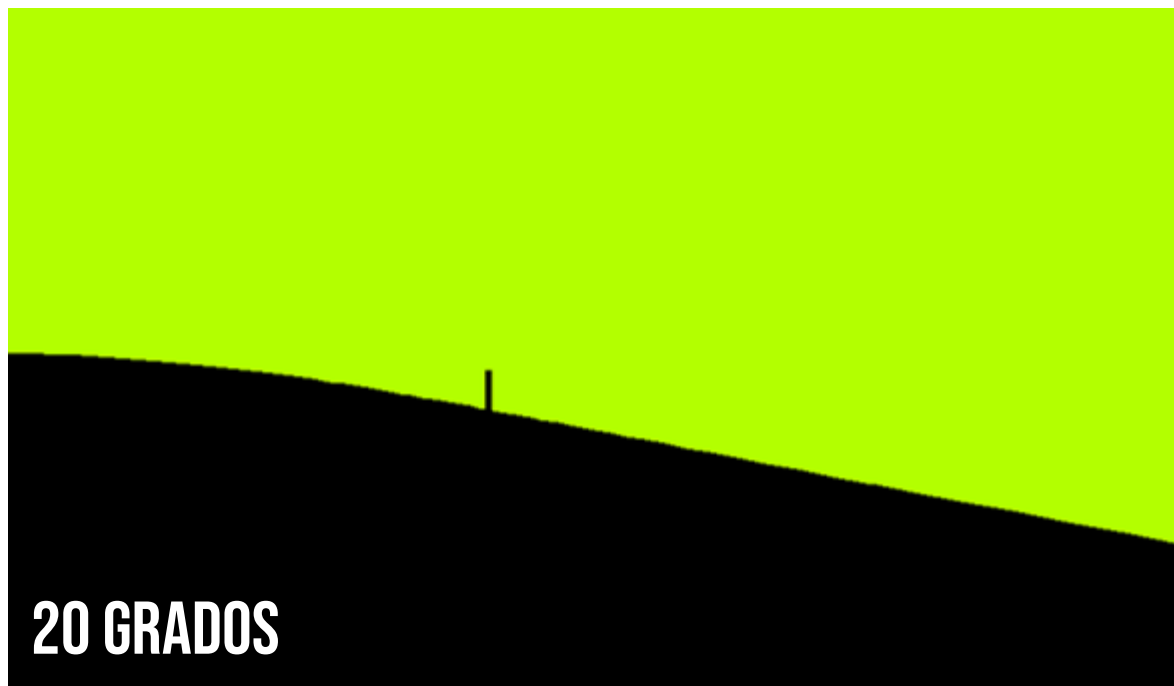
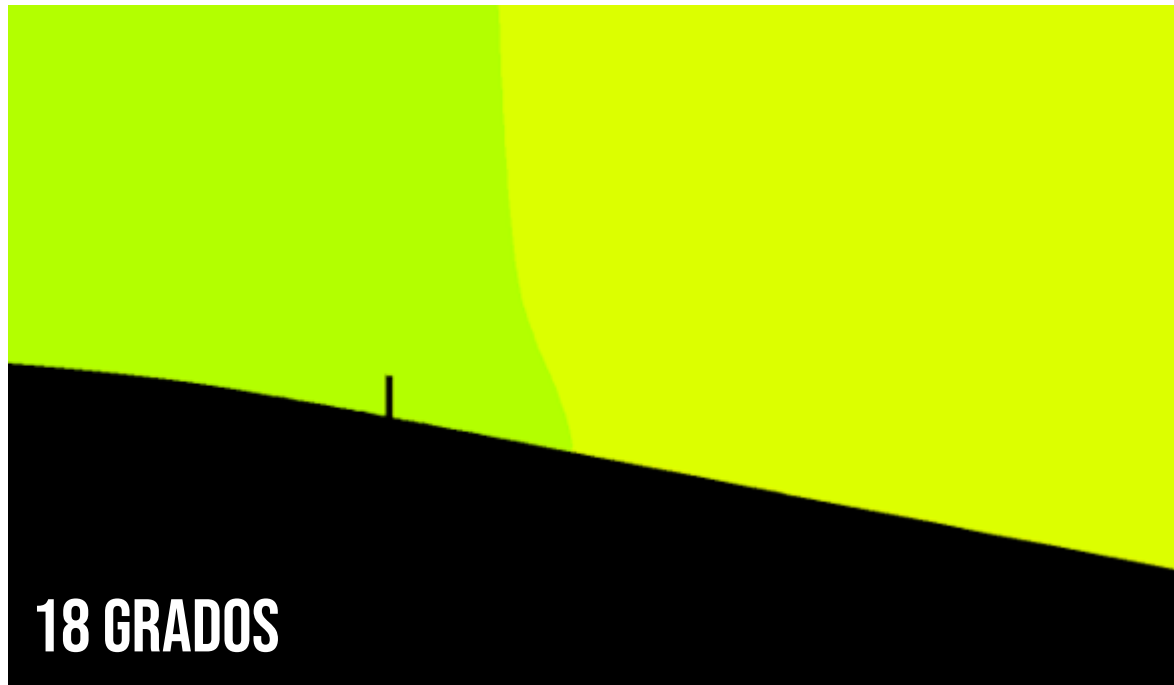
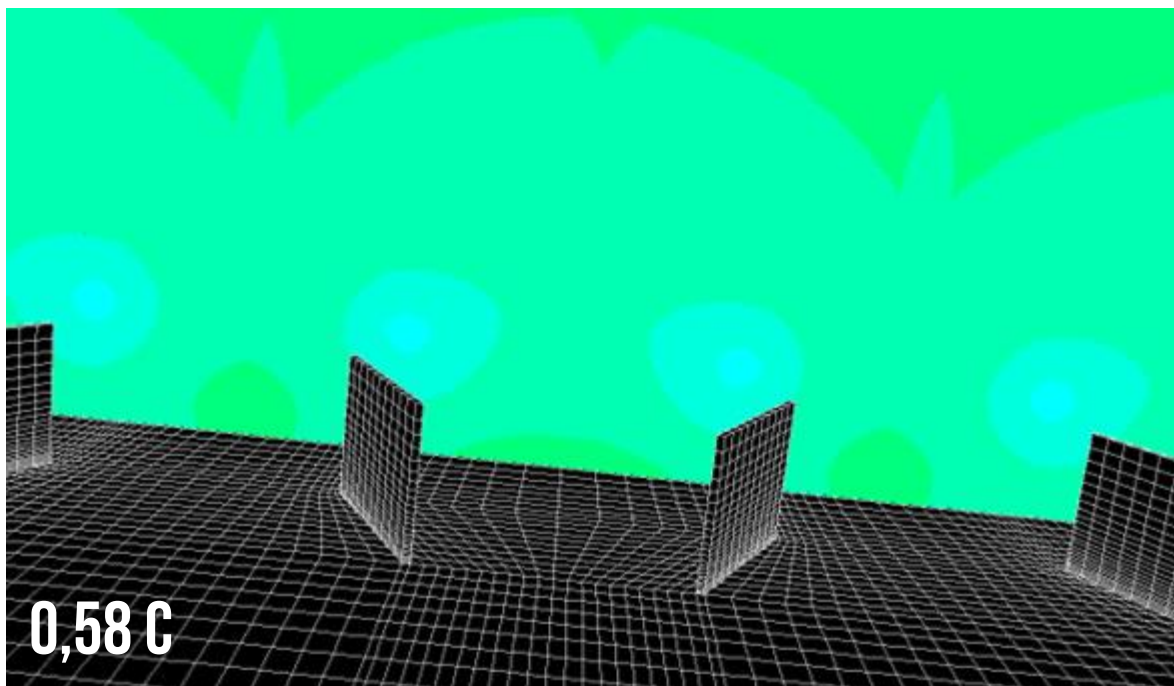
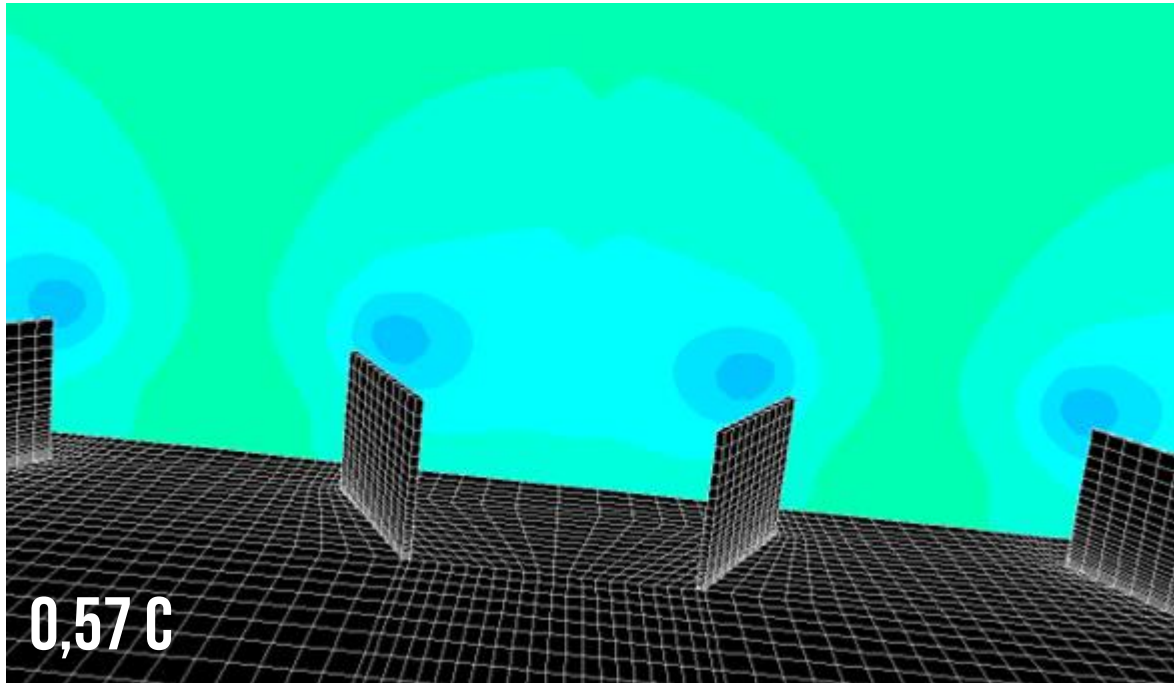
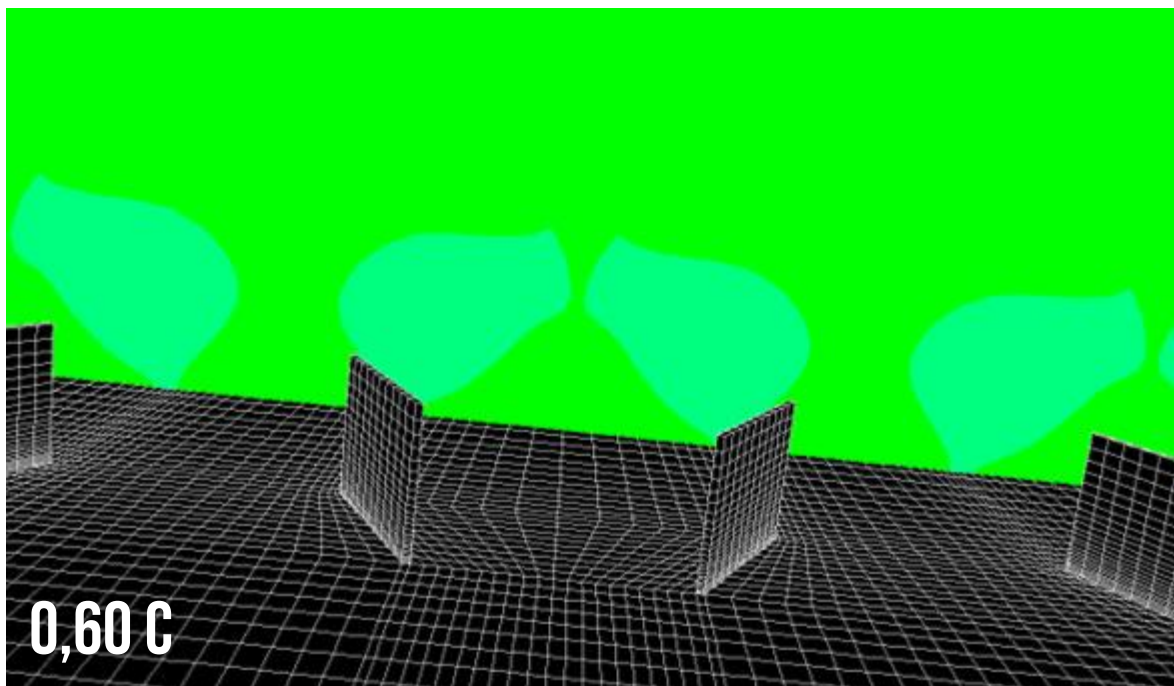
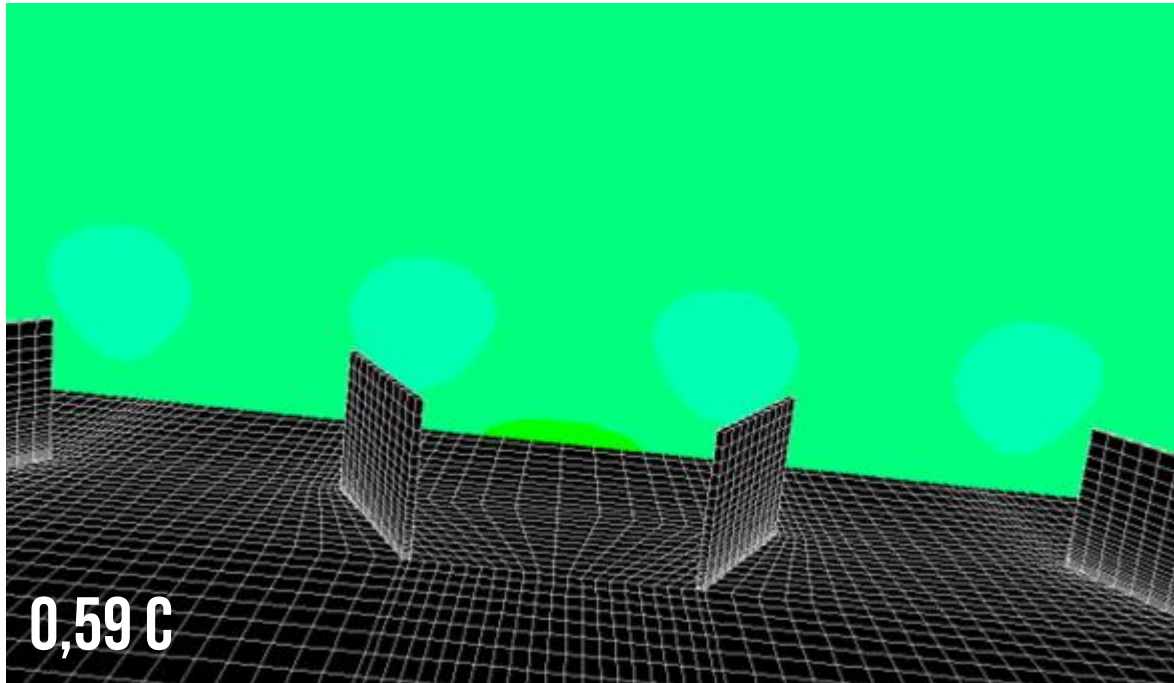


Figura 1.9. Contornos de presión (vista detalle) a distintos ángulos de ataque





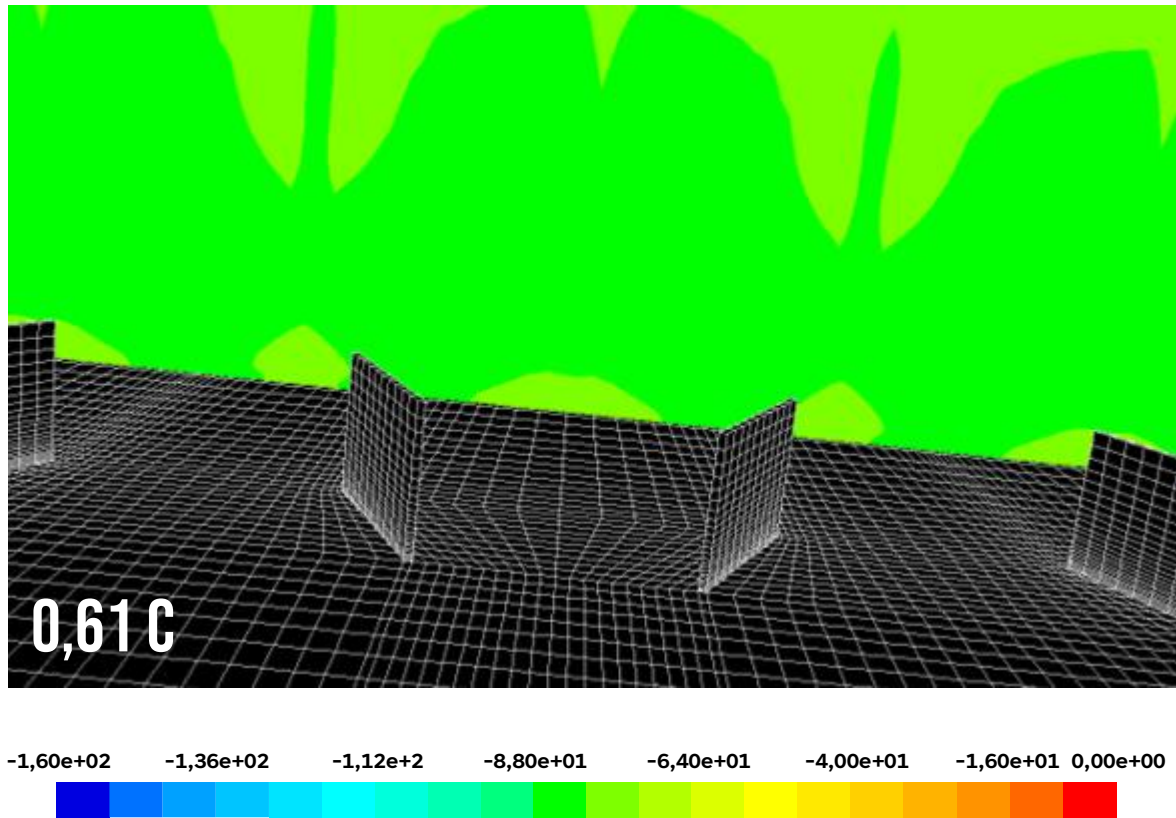
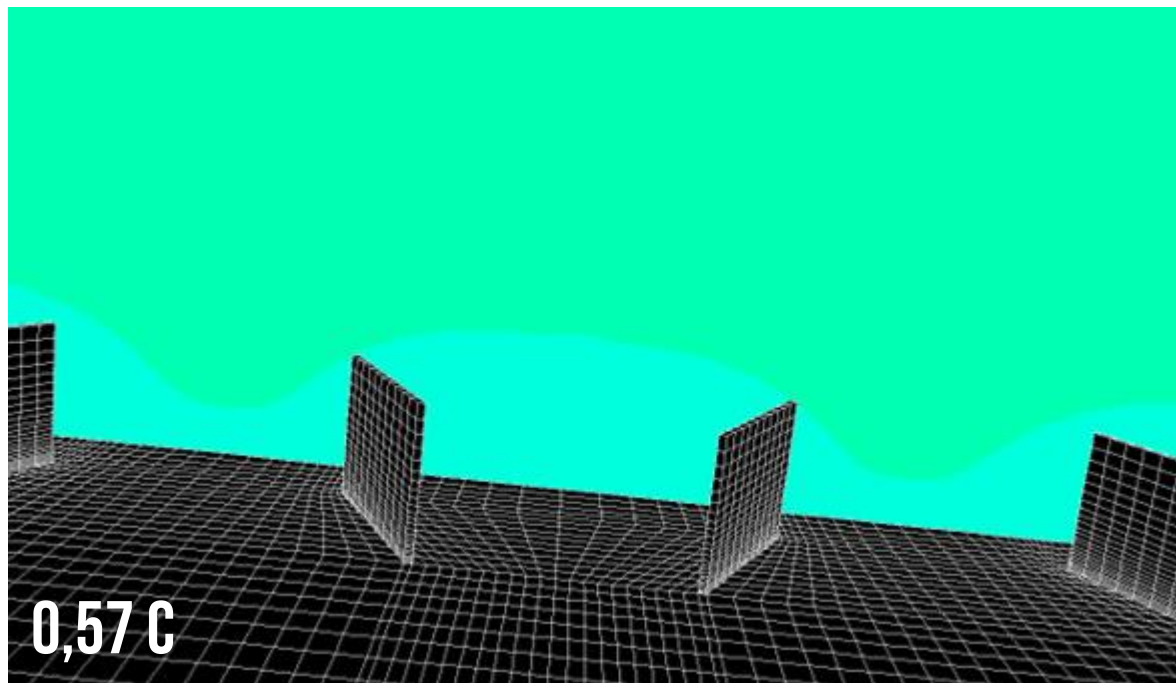
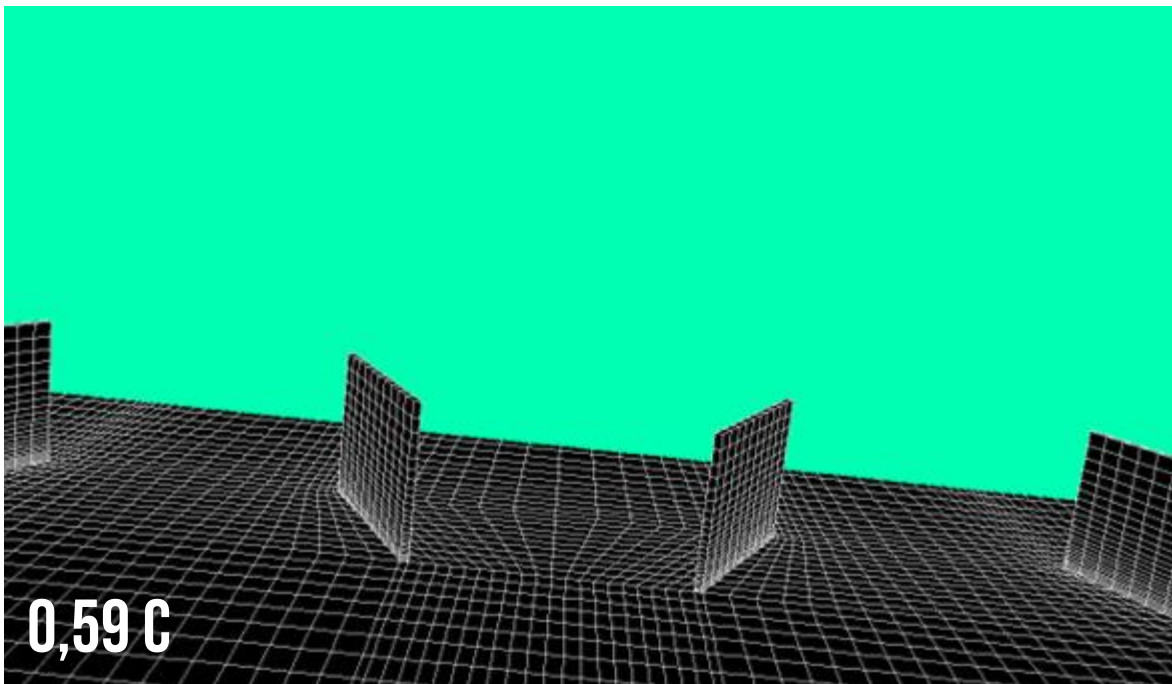
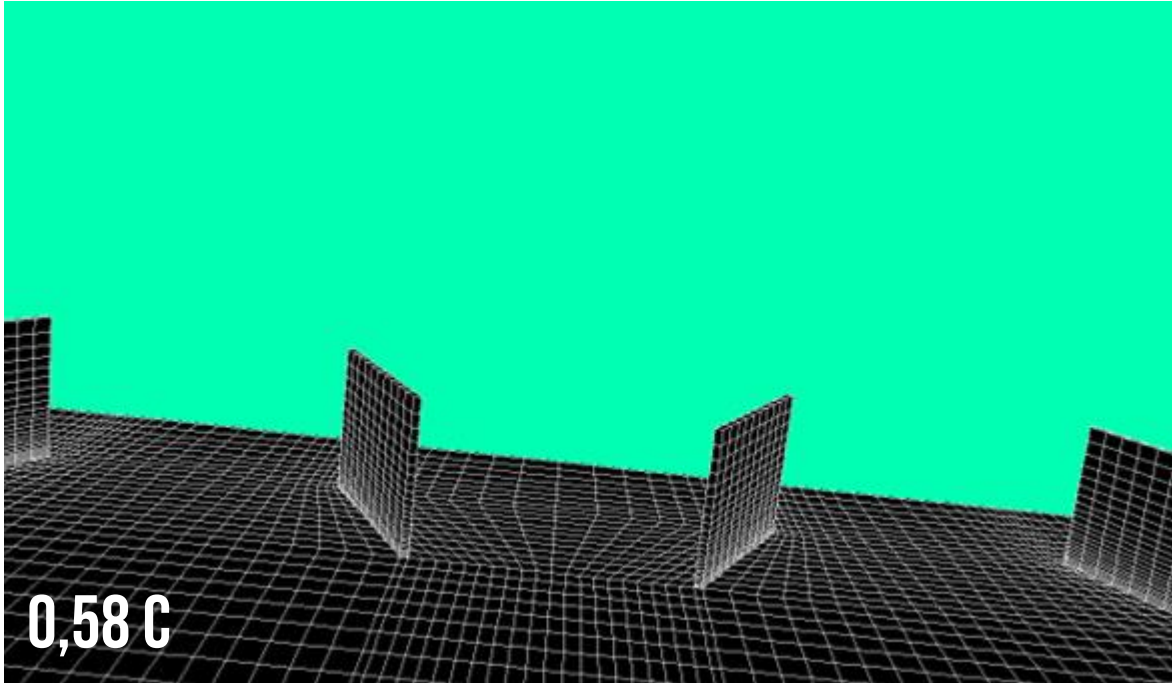


Figura 1.10. Contornos de presión detrás del VG con un ángulo de ataque de 0 grados





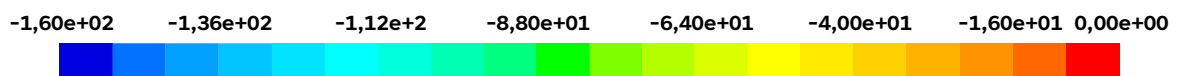
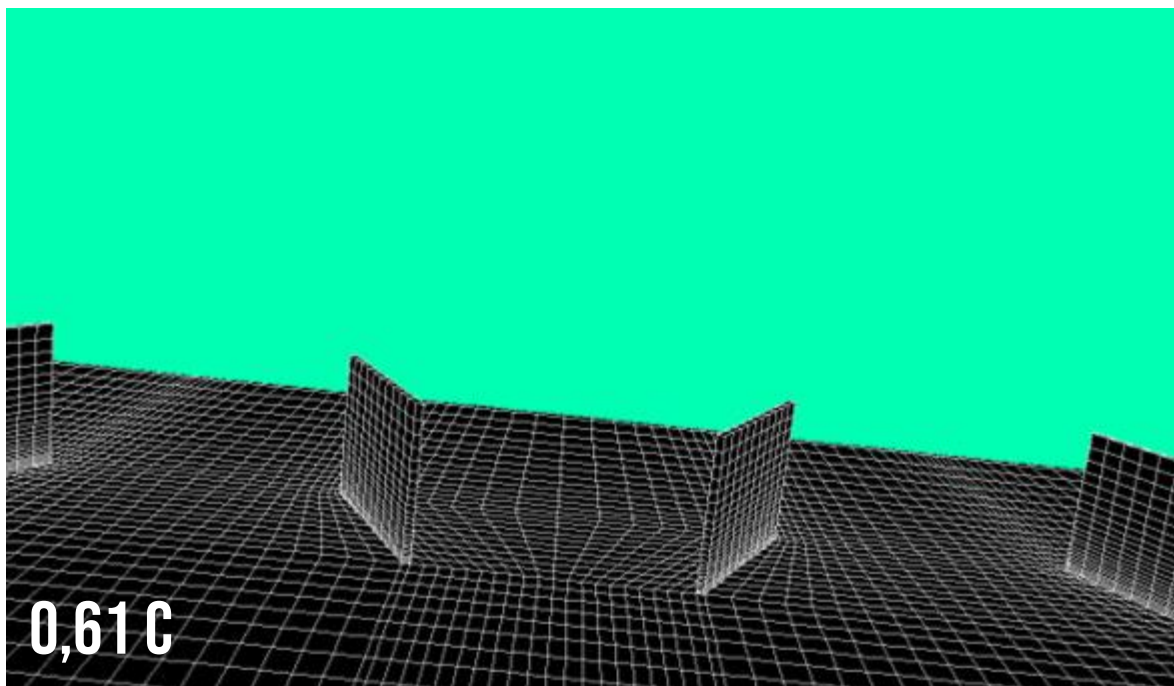
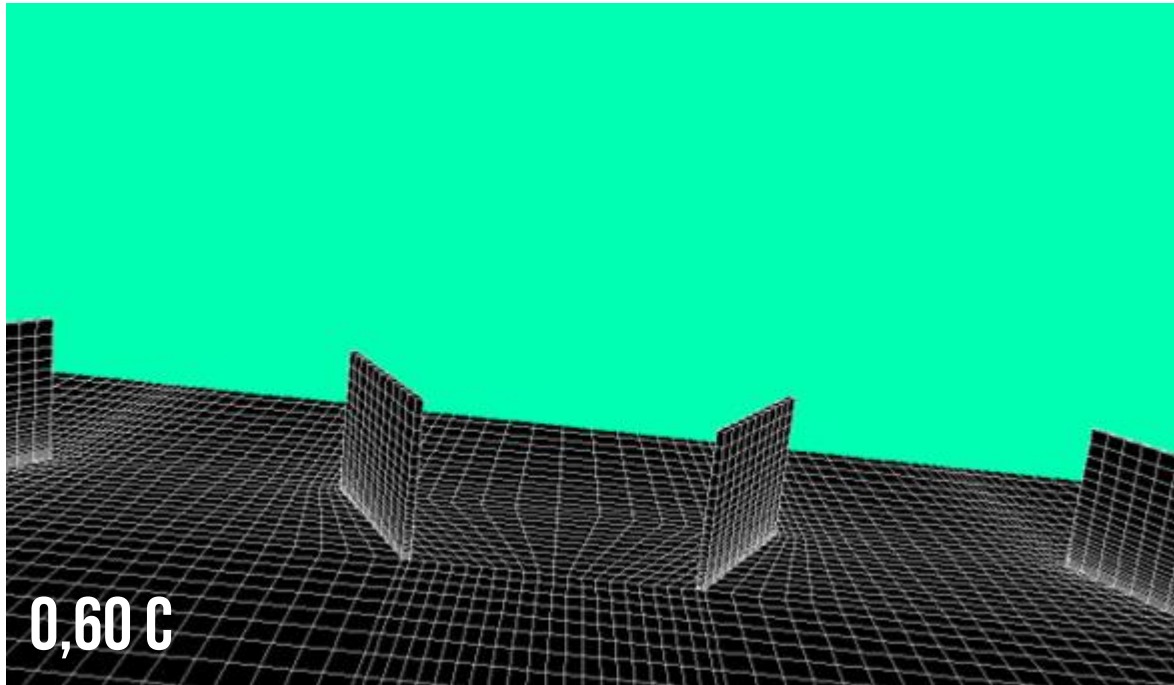
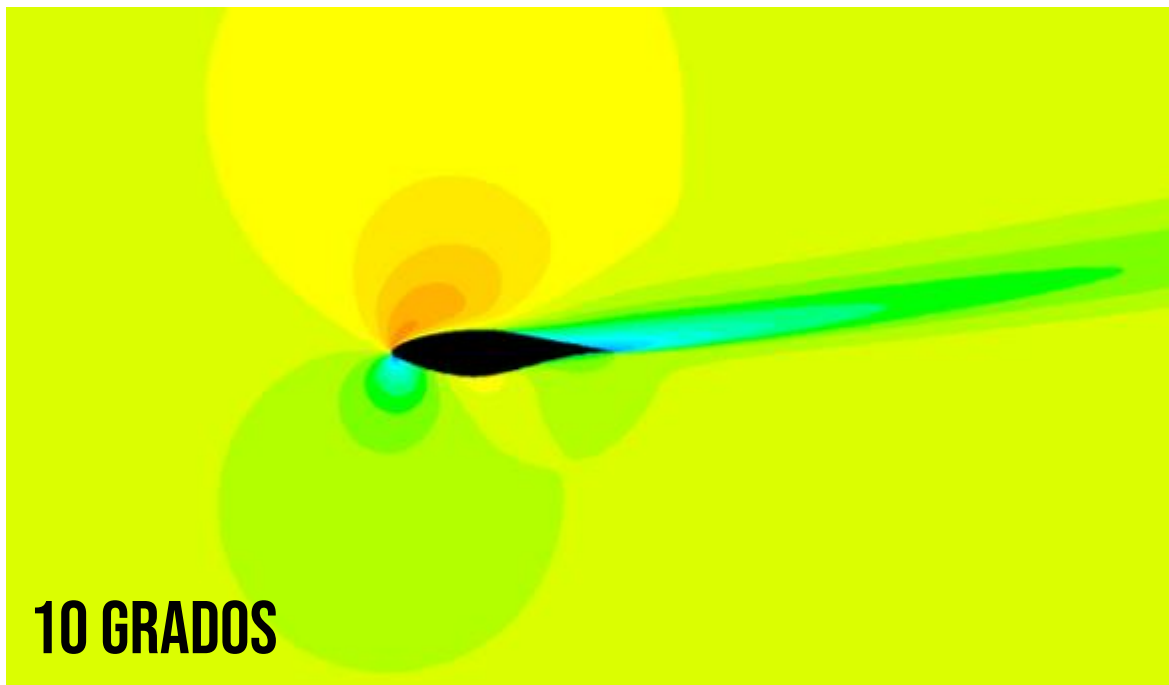
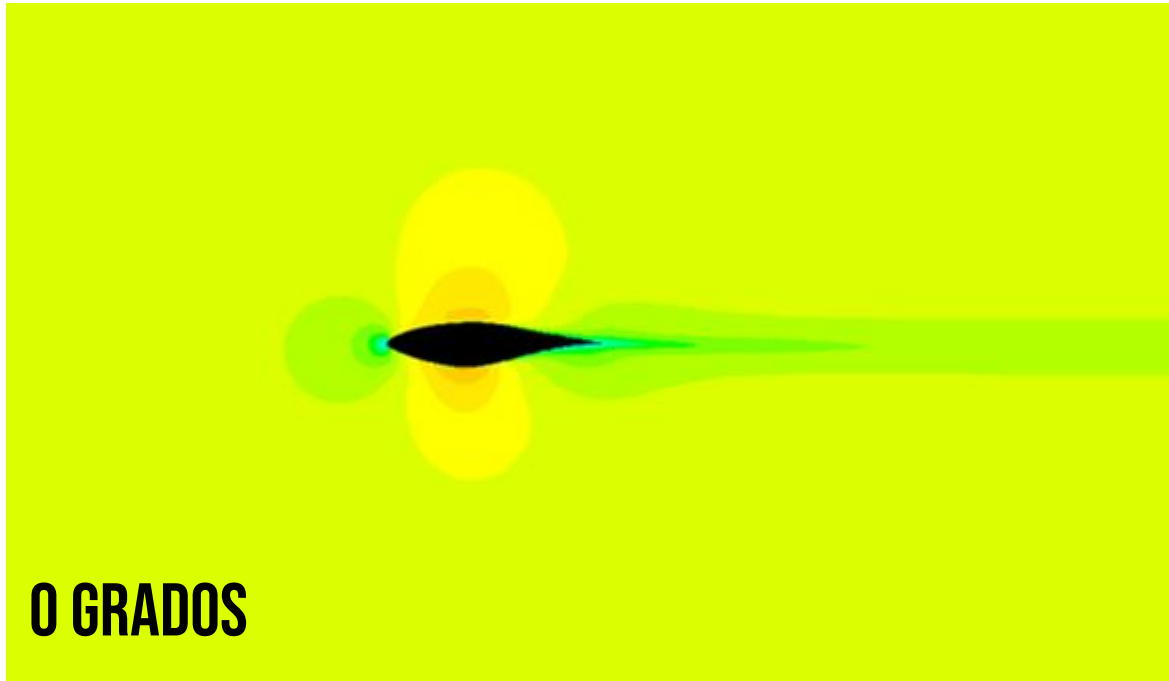
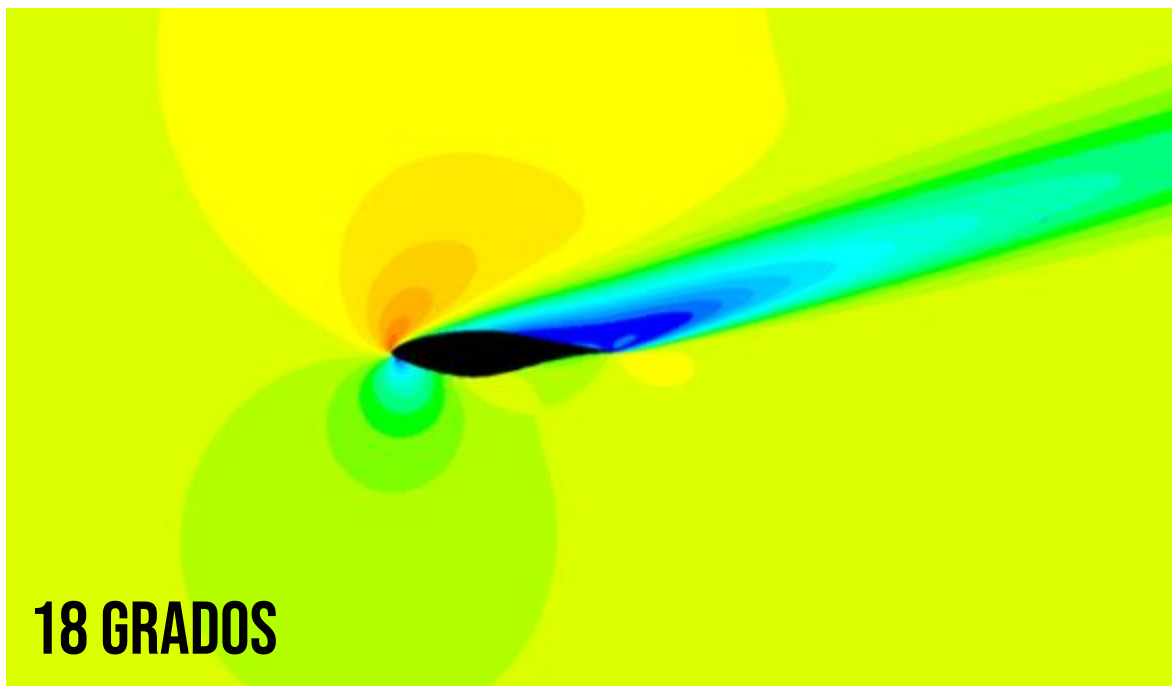
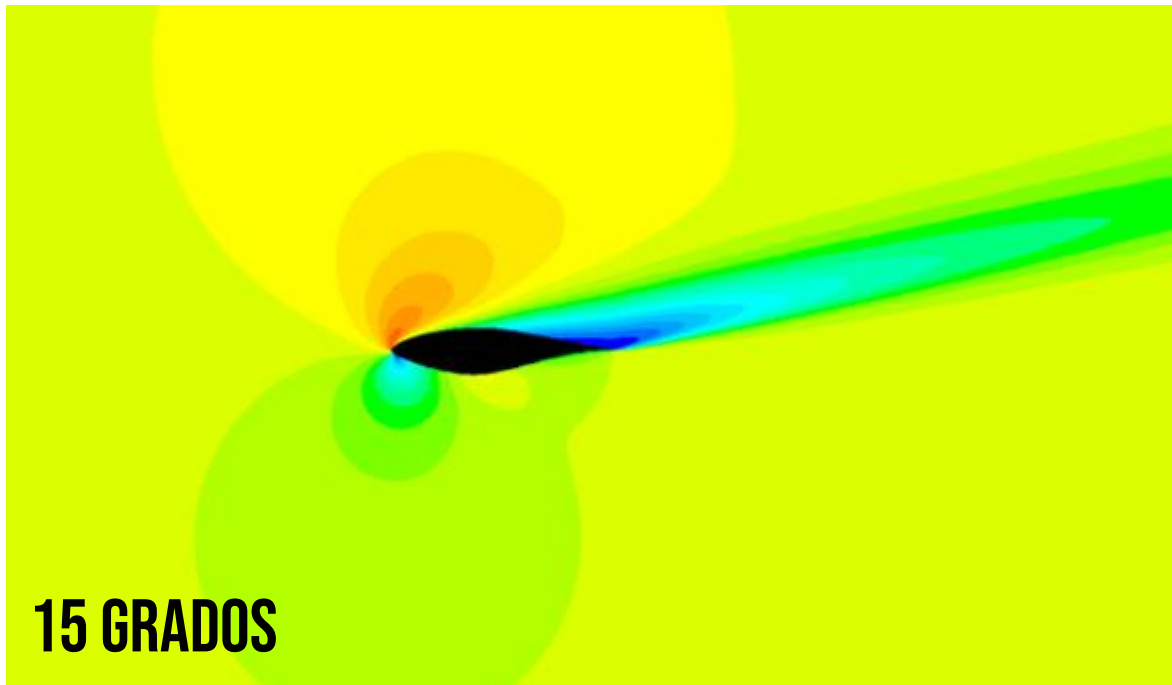


Figura 1.11. Contornos de presión detrás del VG con un ángulo de ataque de 18 grados

1.2.3. Caso 2





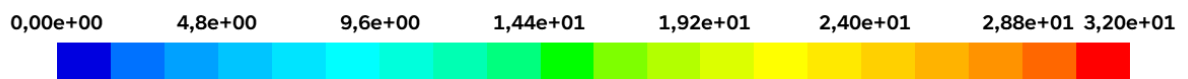
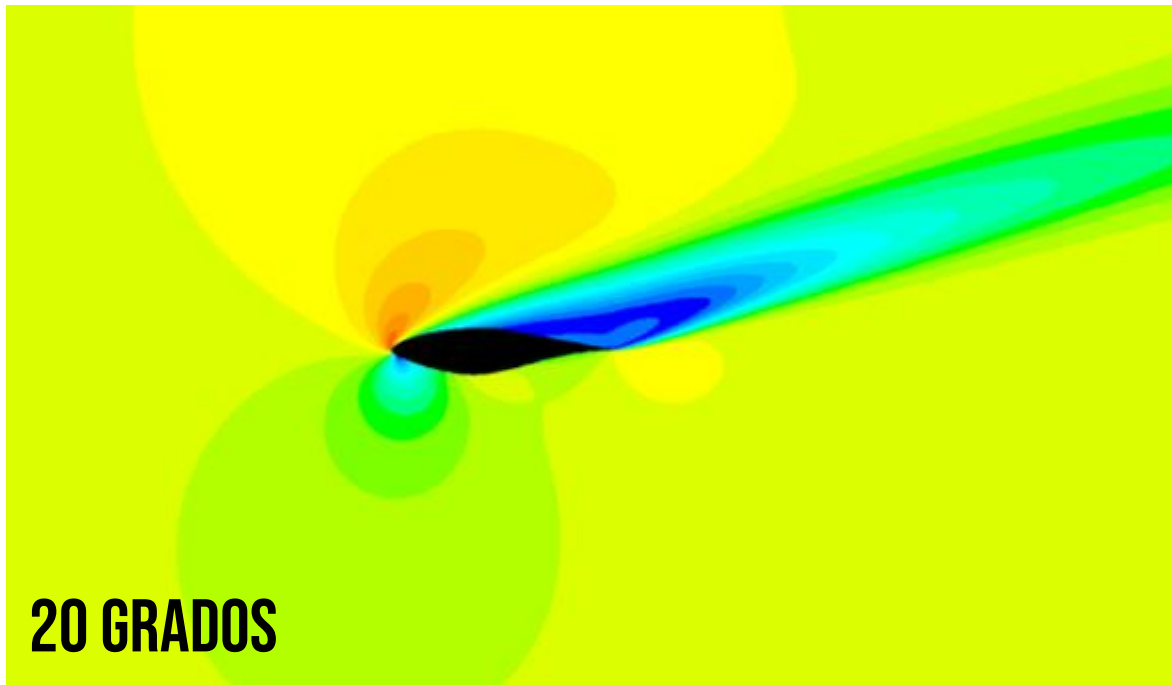
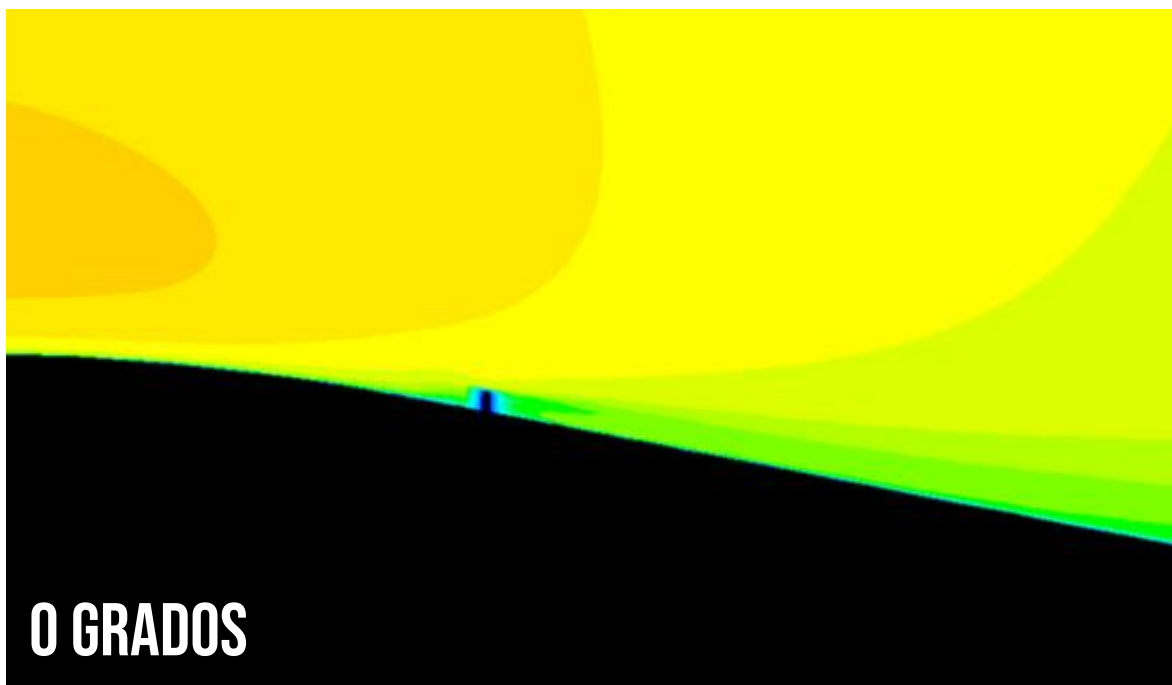
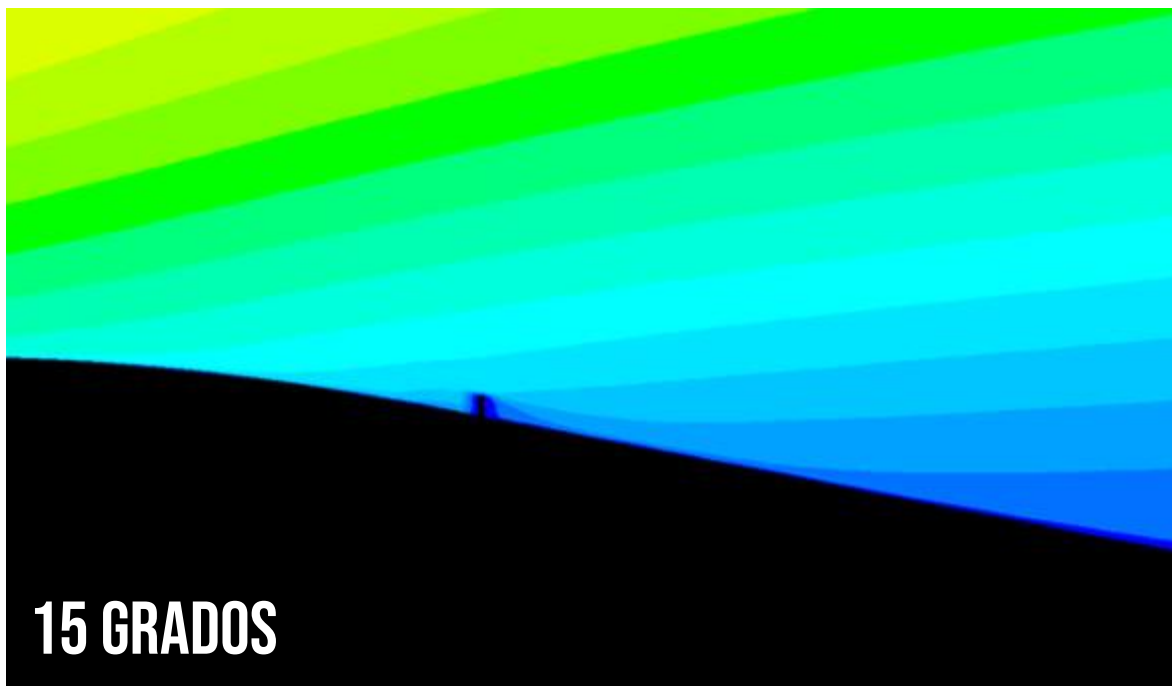
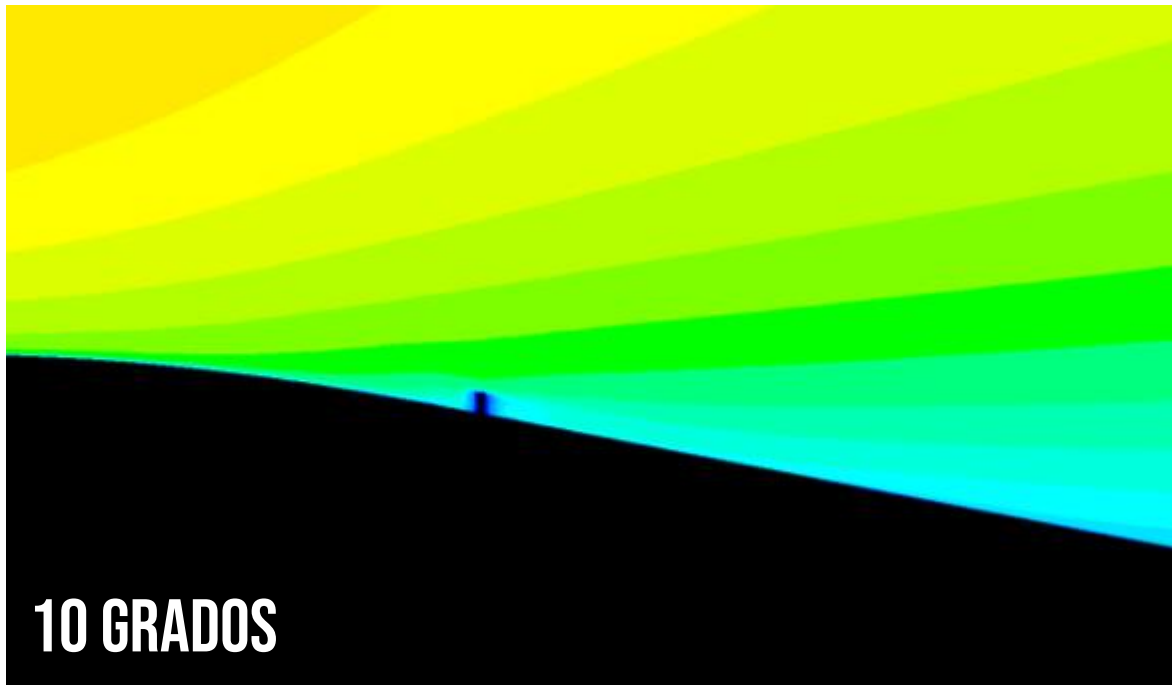


Figura 1.12. Contornos de velocidad (vista general) para diferentes ángulos de ataque





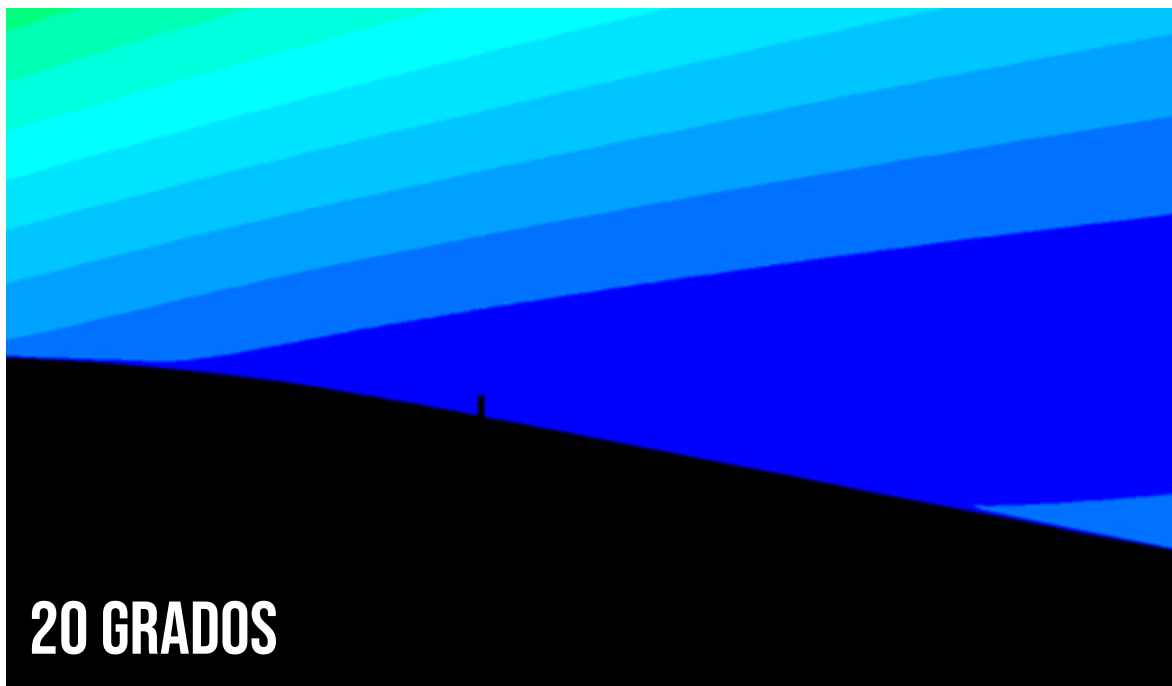
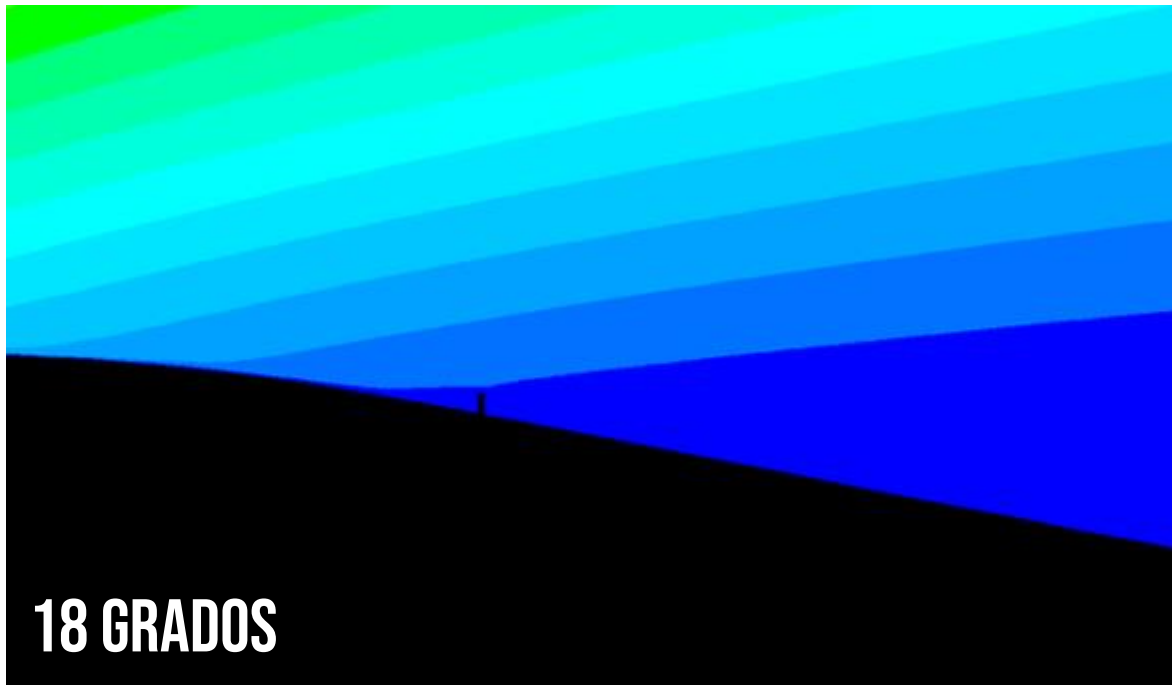
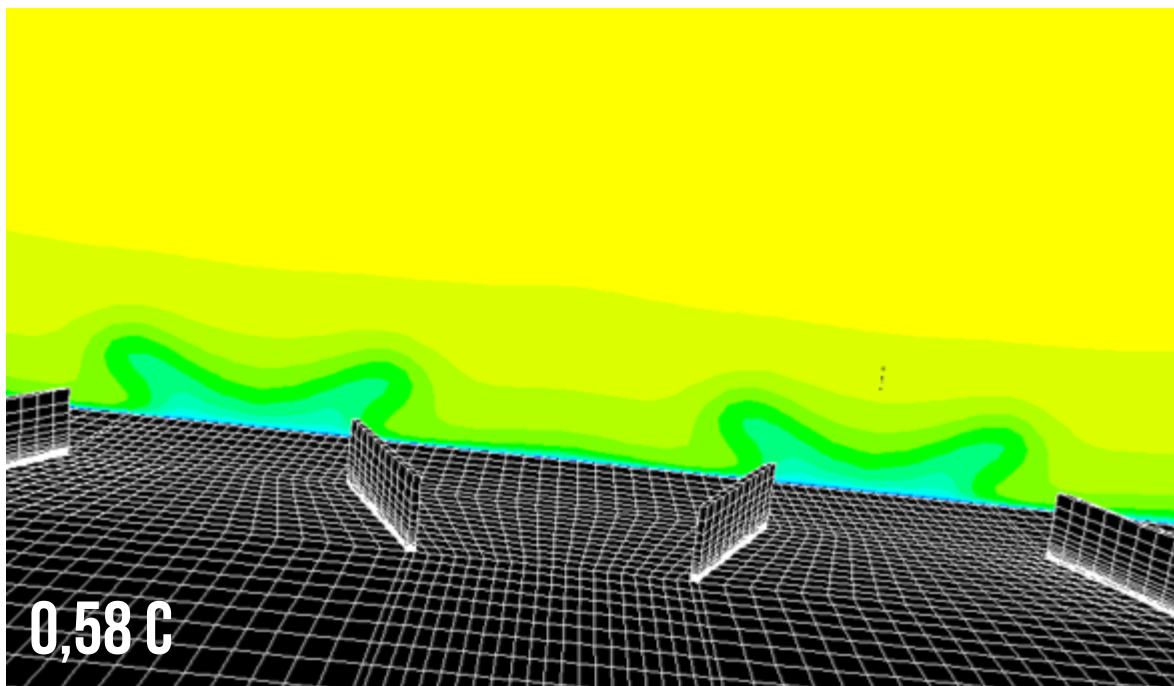
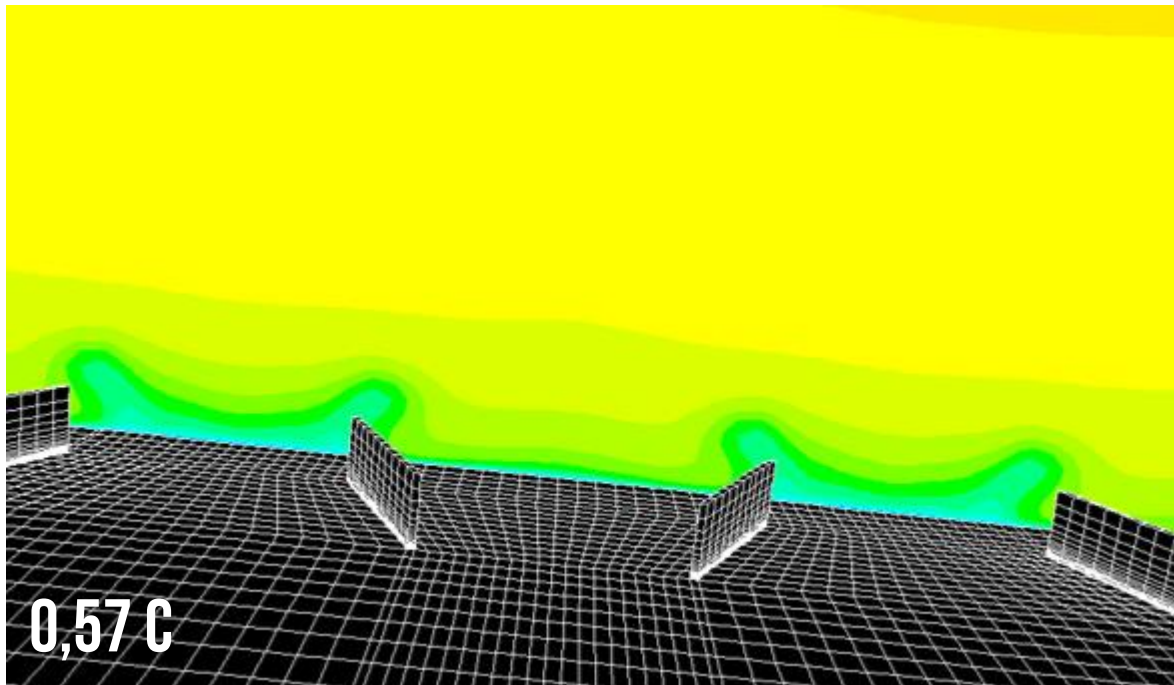
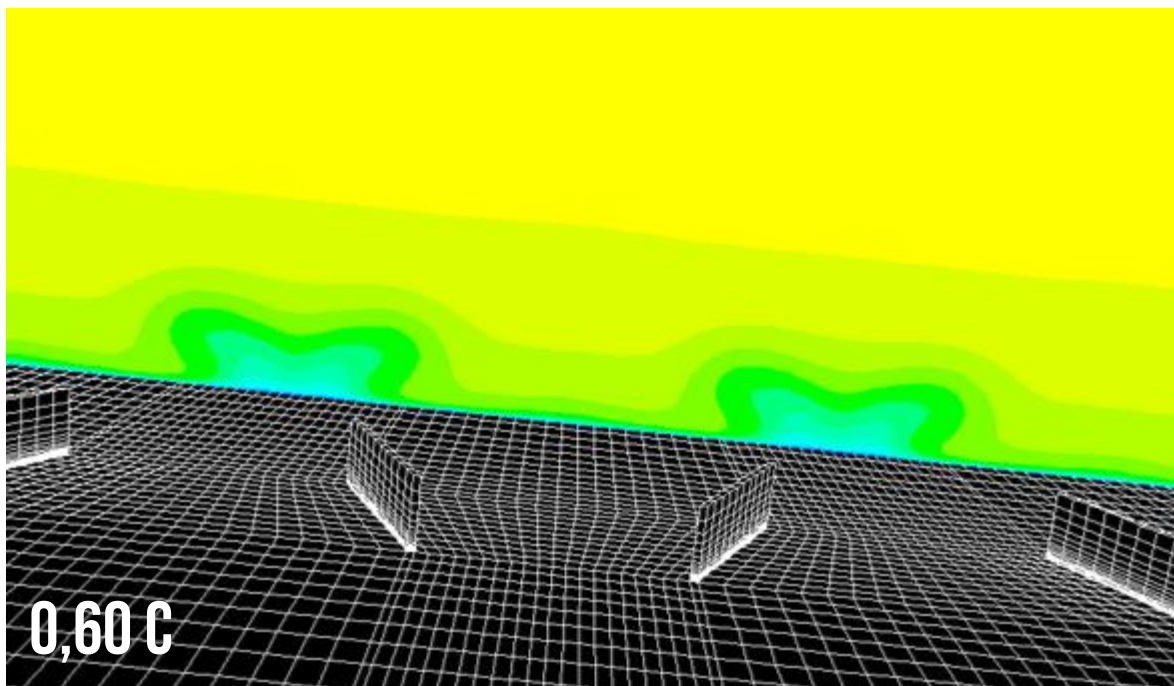
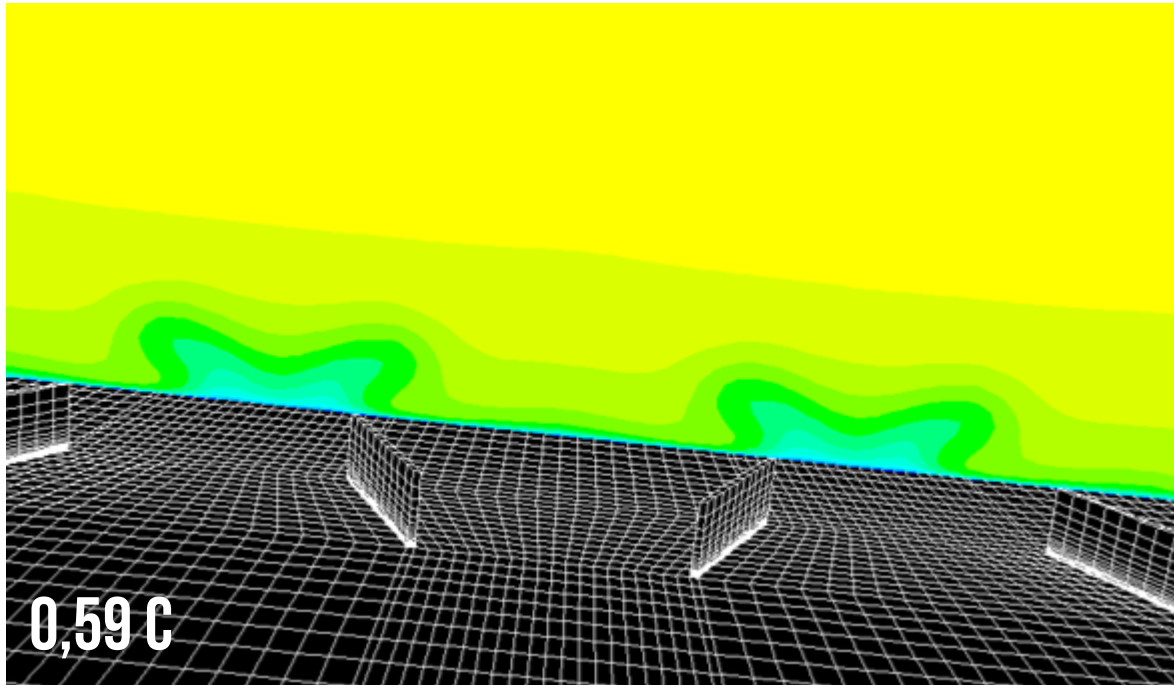


Figura 1.13. Contornos de velocidad (vista detalle) para diferentes ángulos de ataque





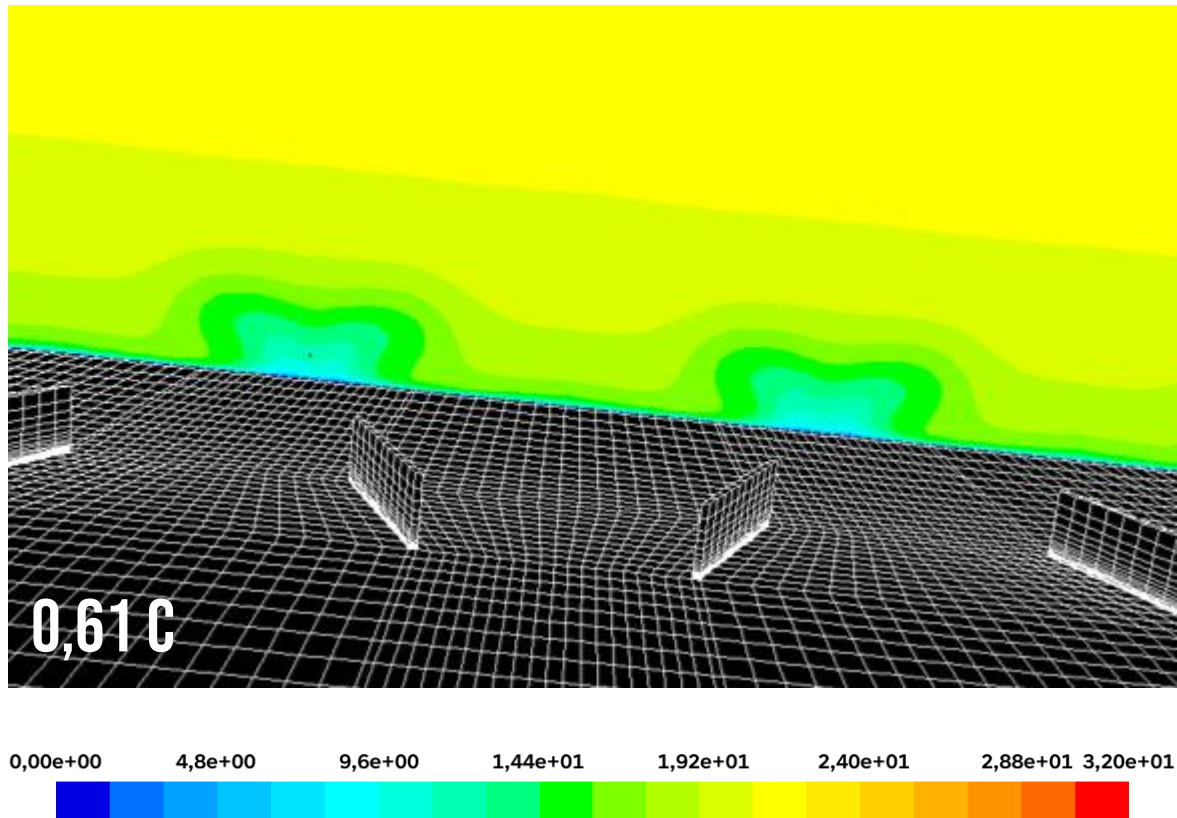
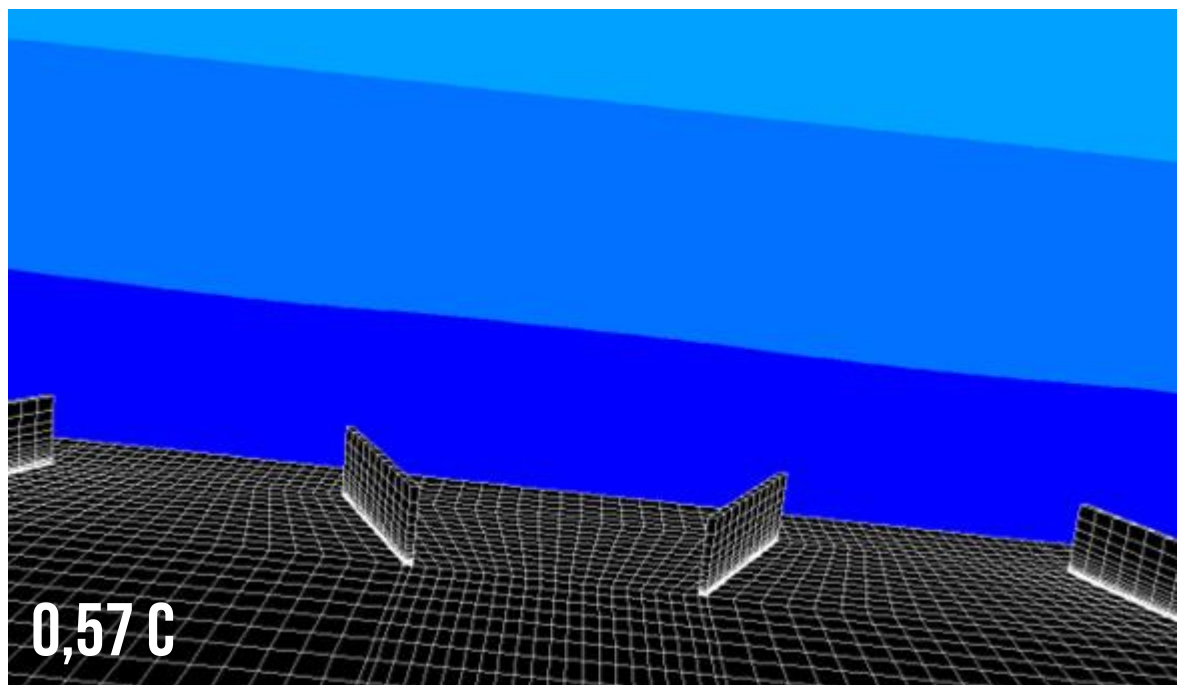
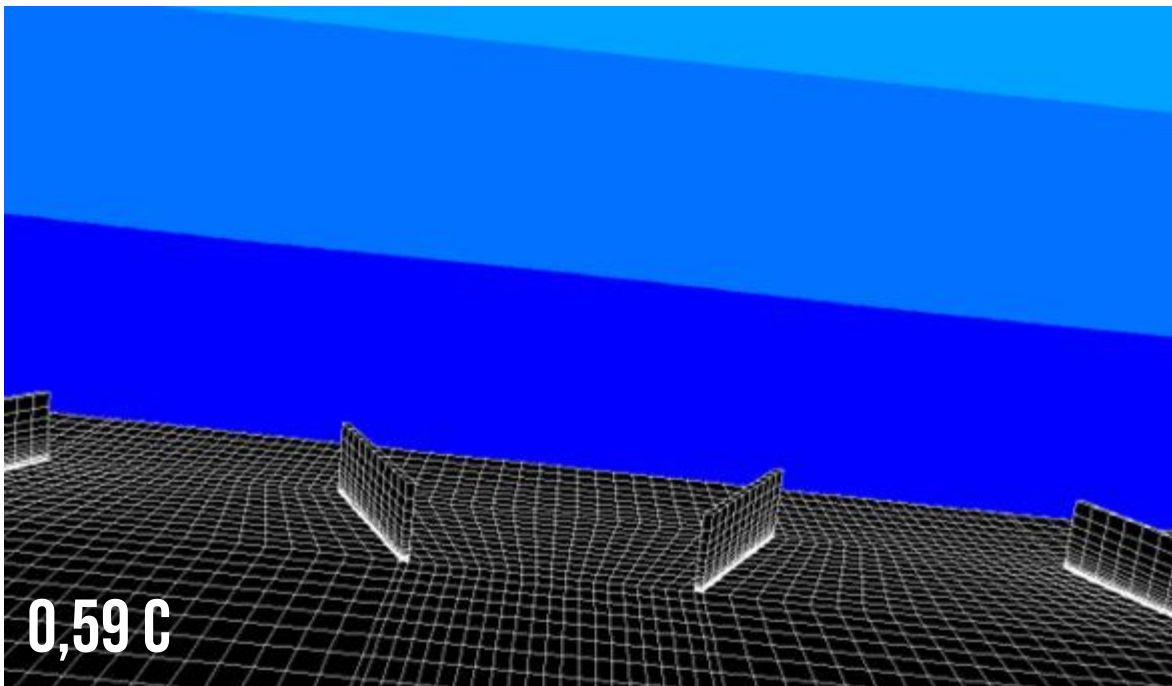
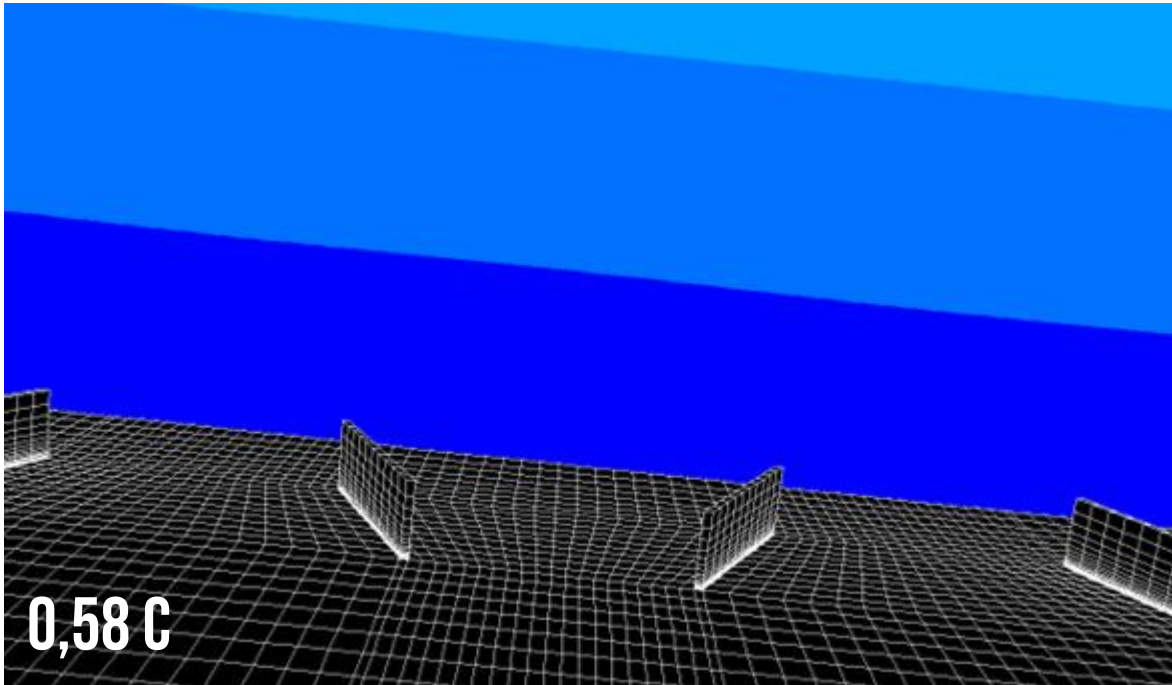


Figura 1.14. Contornos de velocidad detrás del VG con un ángulo de ataque de 0 grados





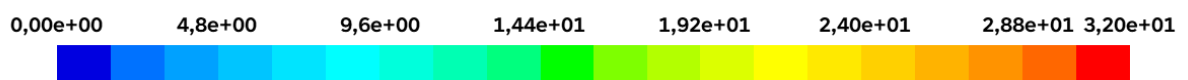
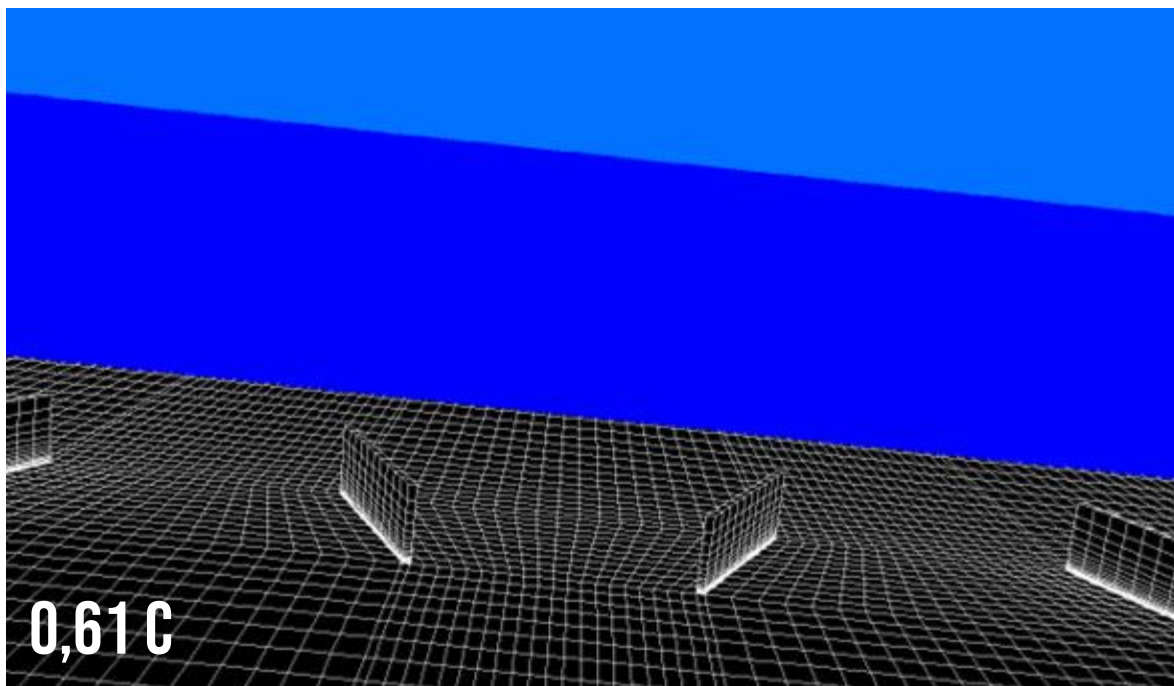
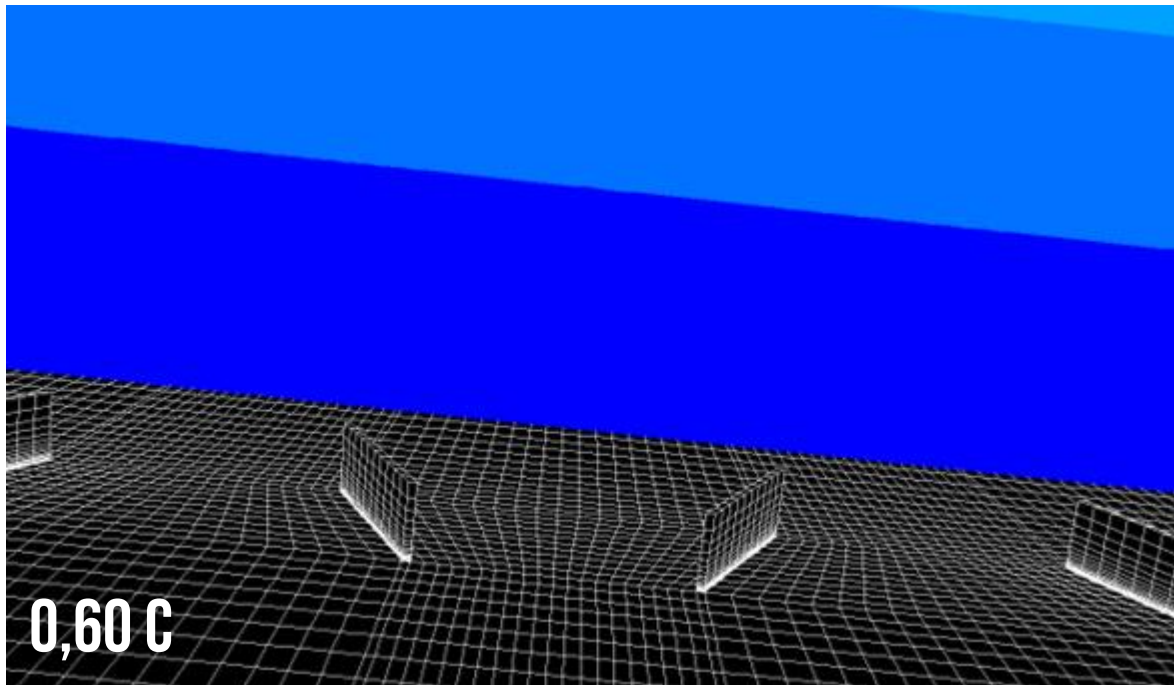
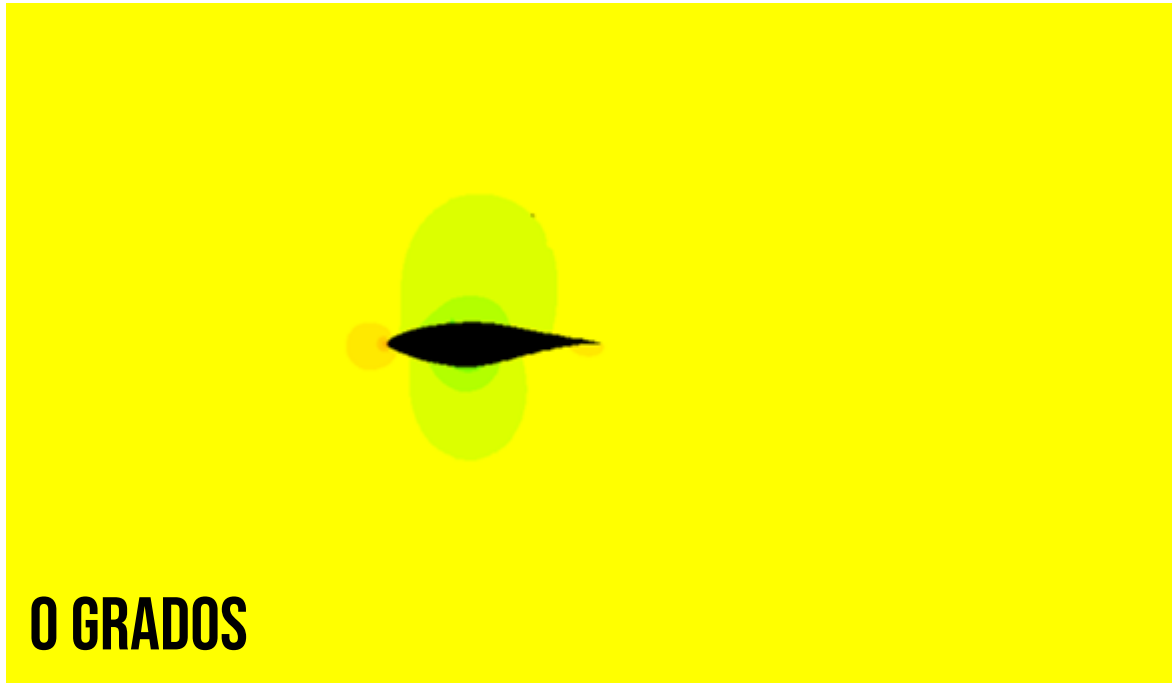
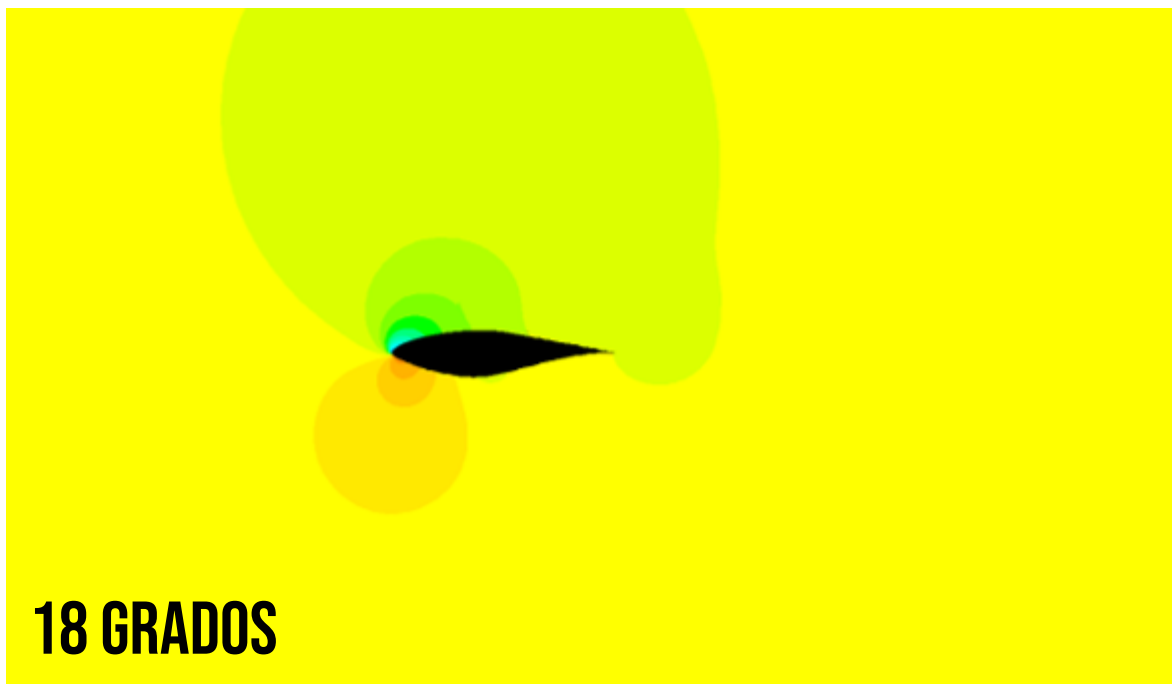
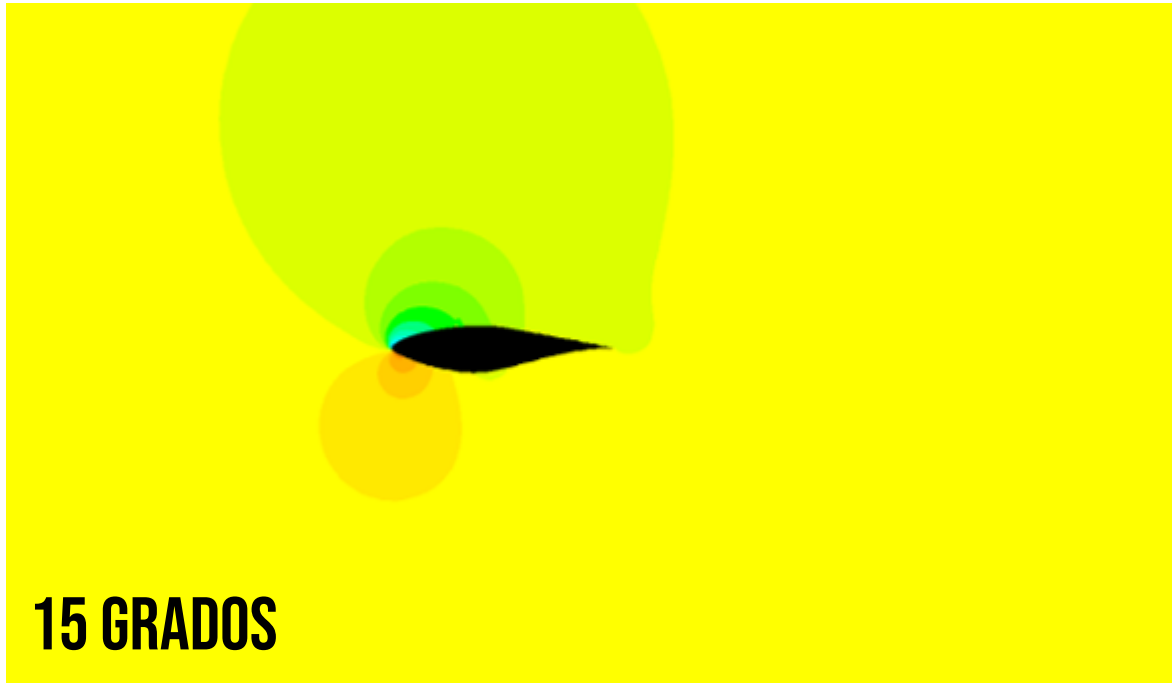


Figura 1.15. Contornos de velocidad detrás del VG con un ángulo de ataque de 18 grados





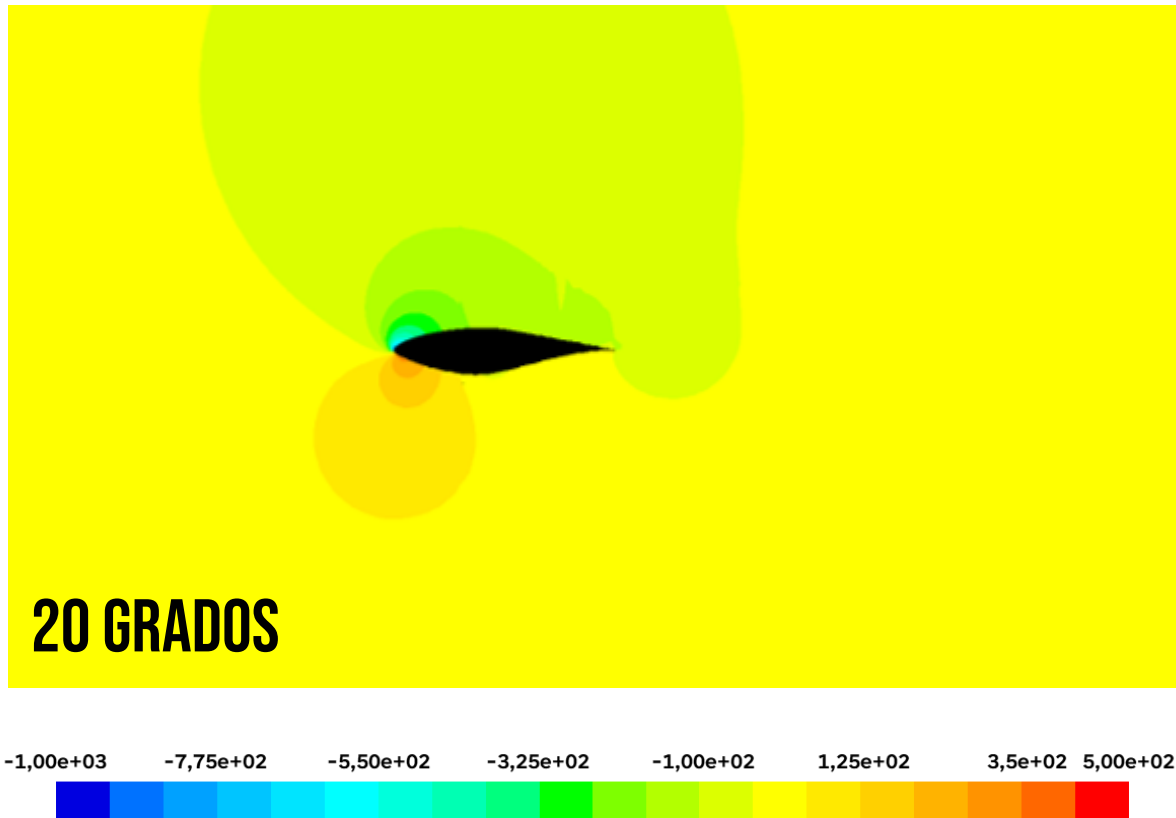
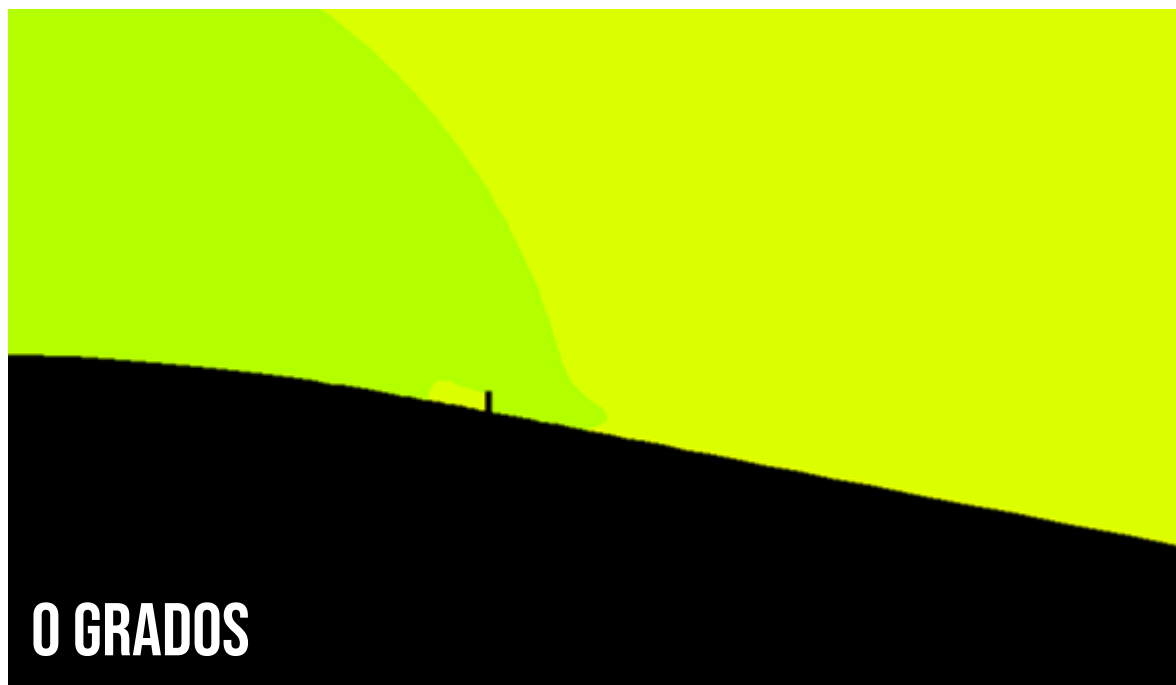
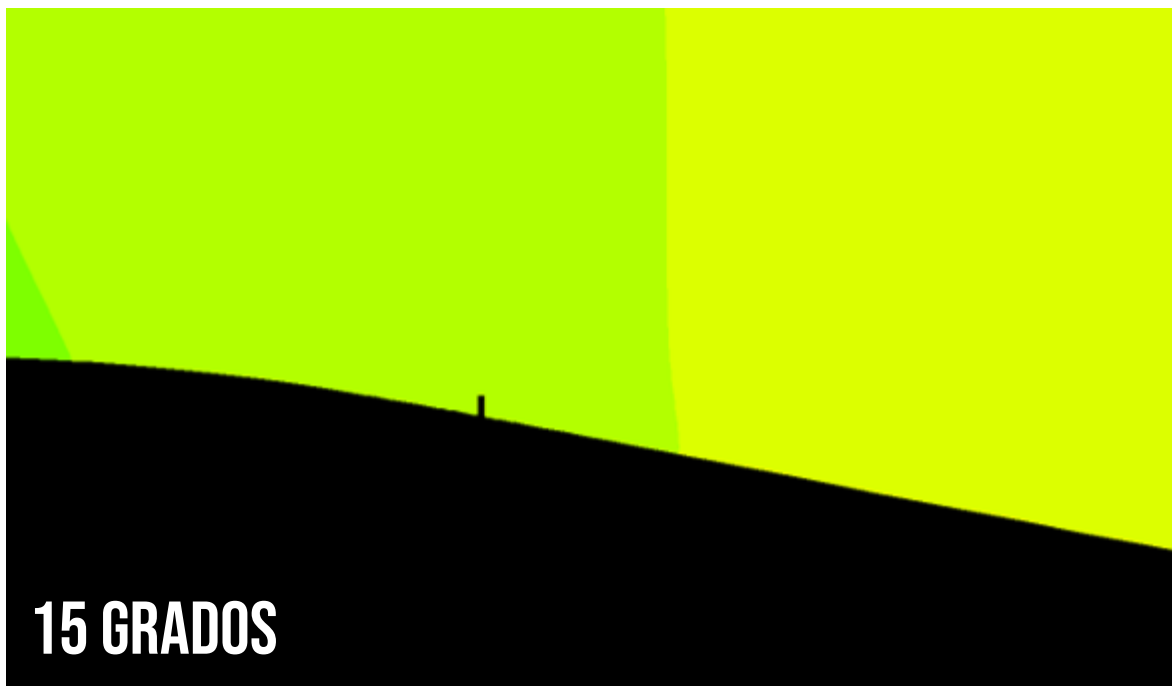
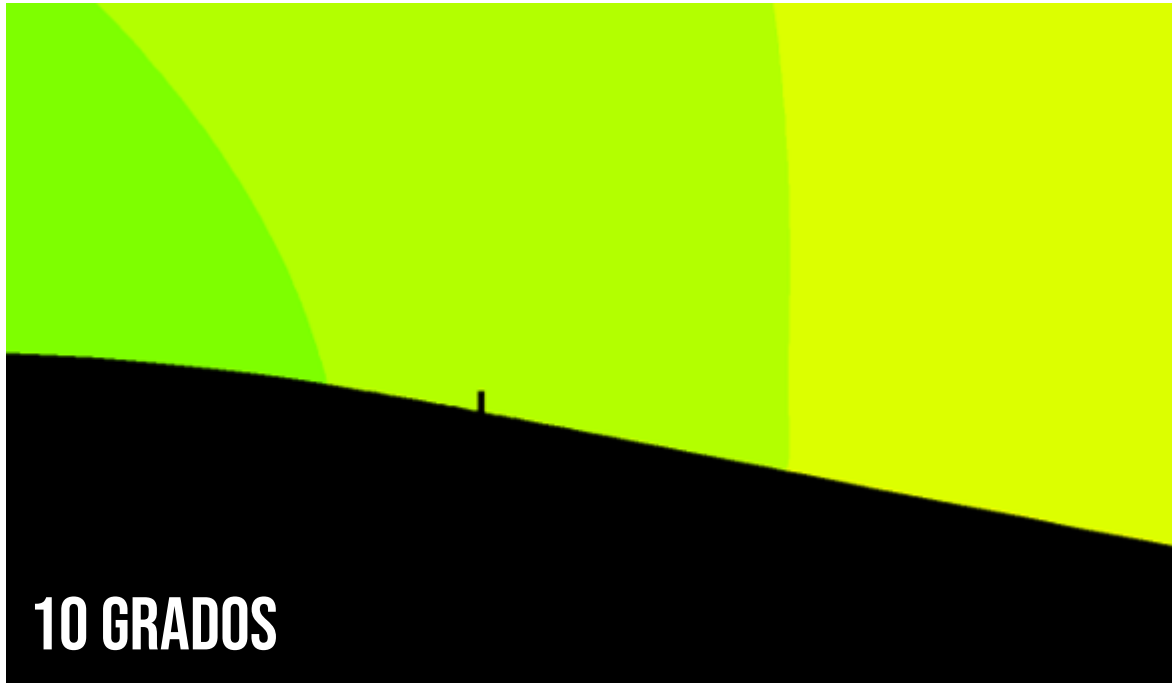


Figura 1.16- Contornos de presión (vista general) a diferentes ángulos de ataque





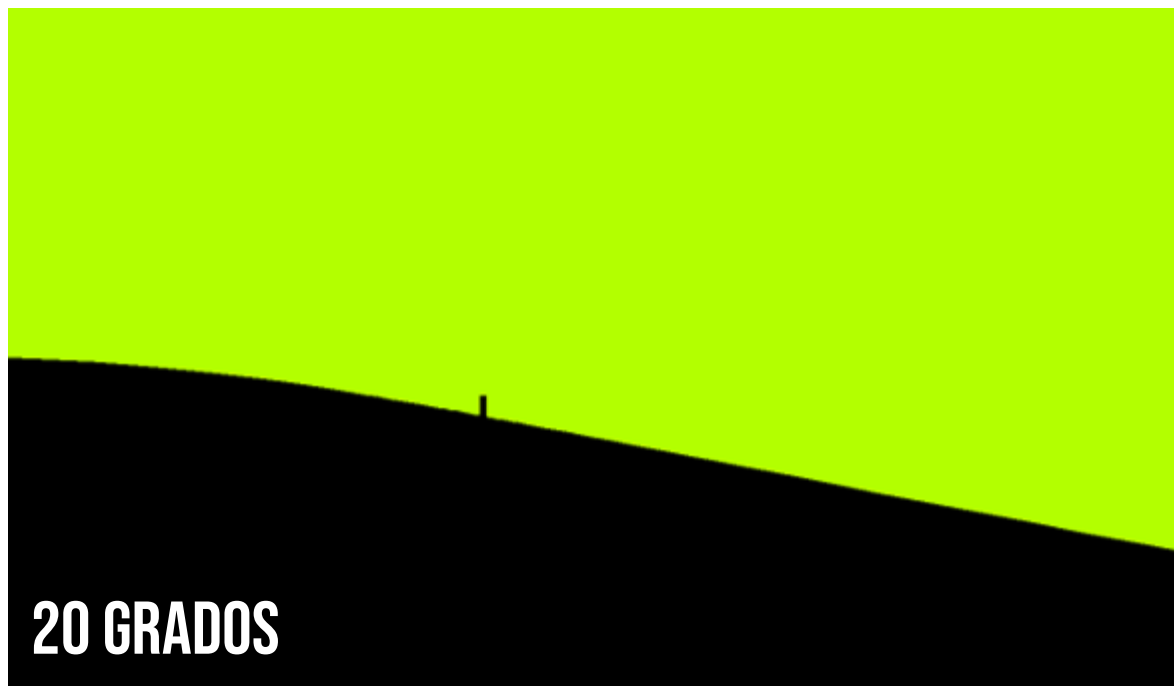
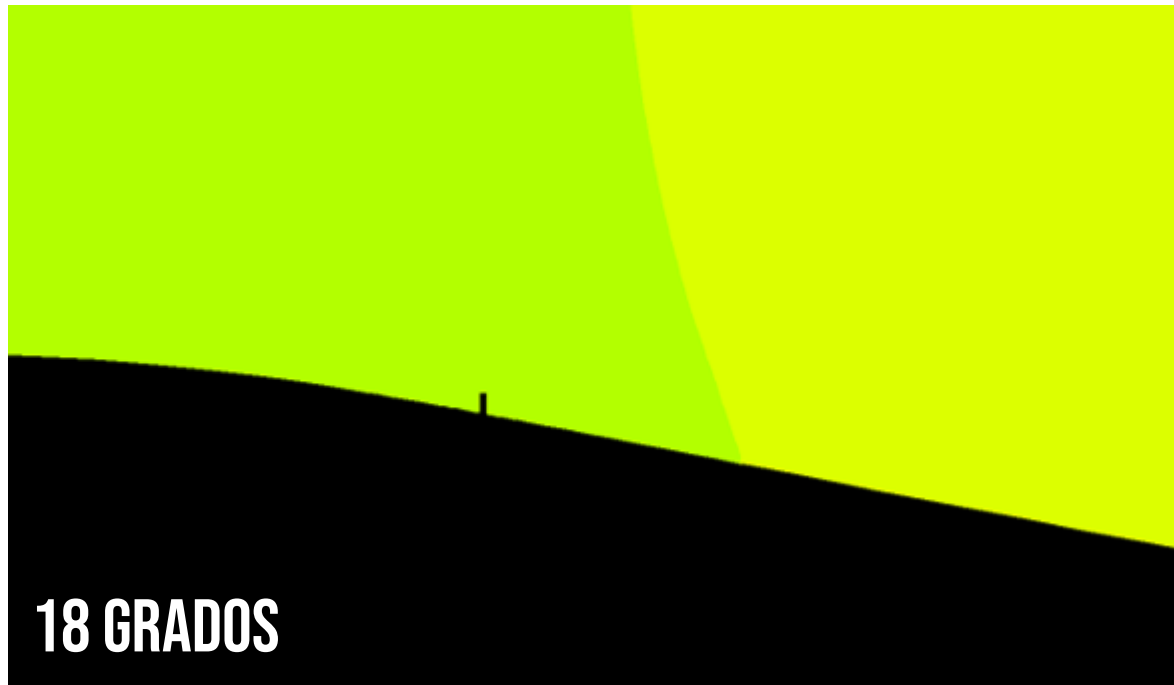
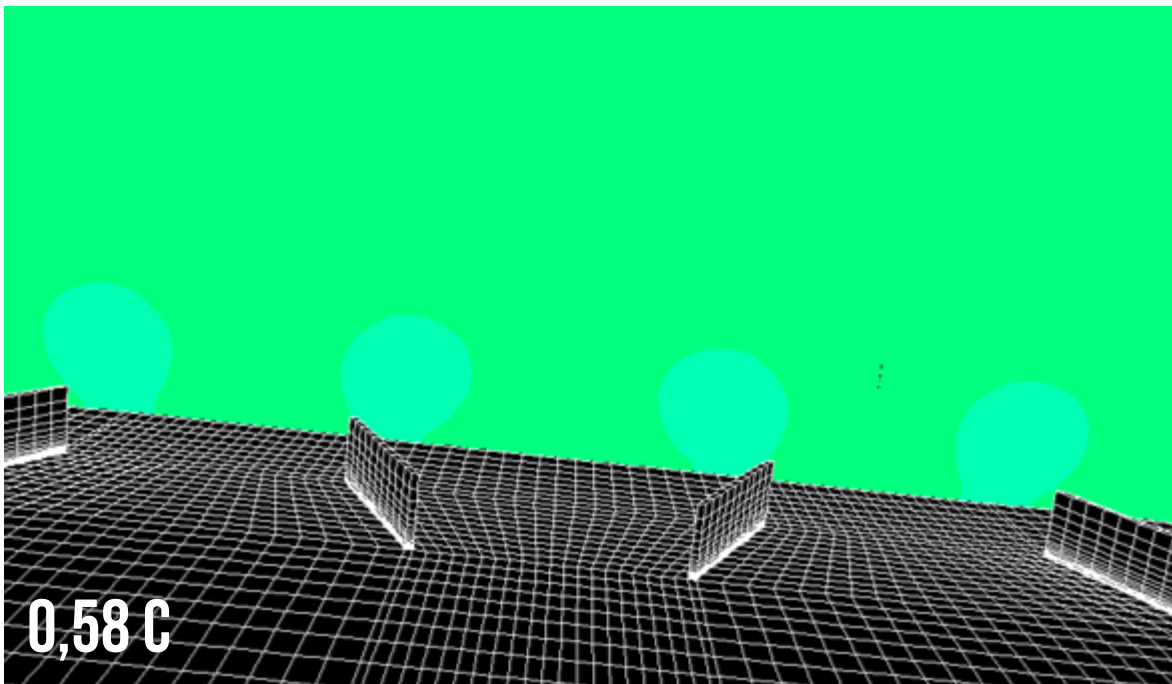
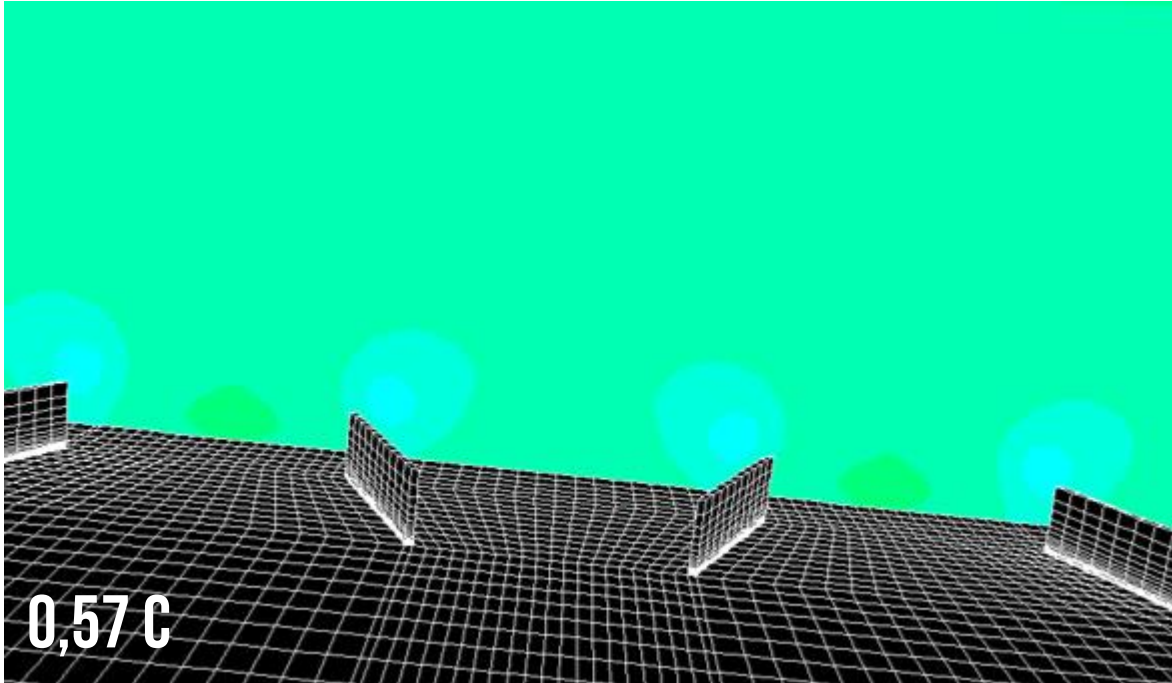
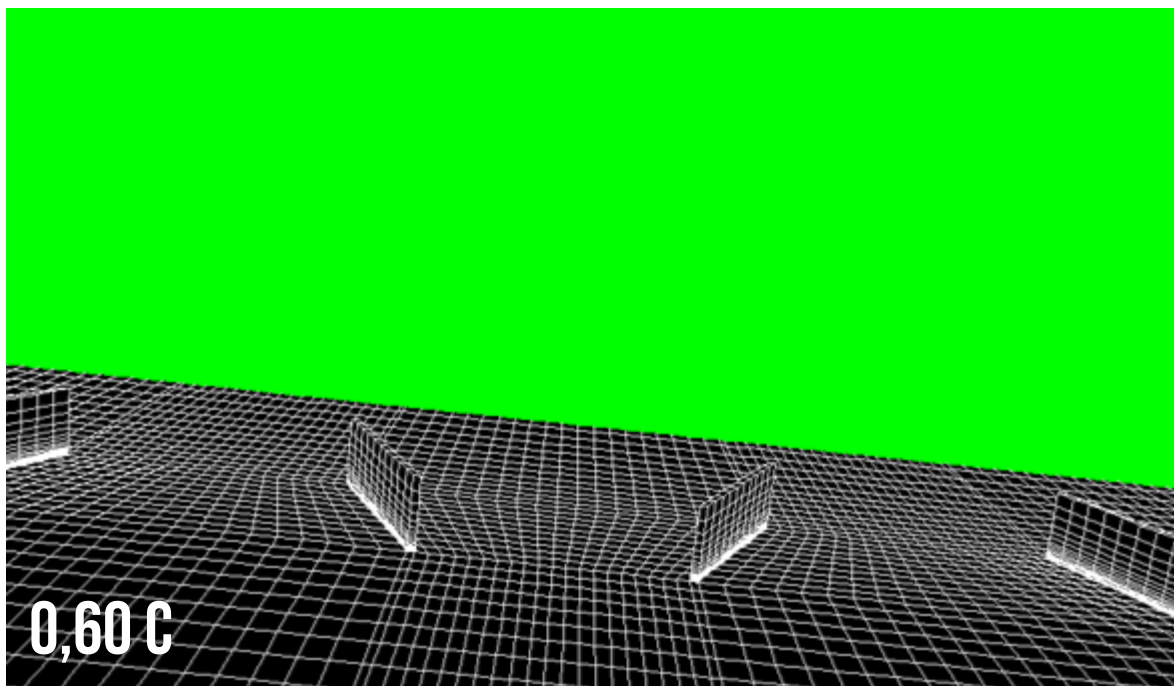
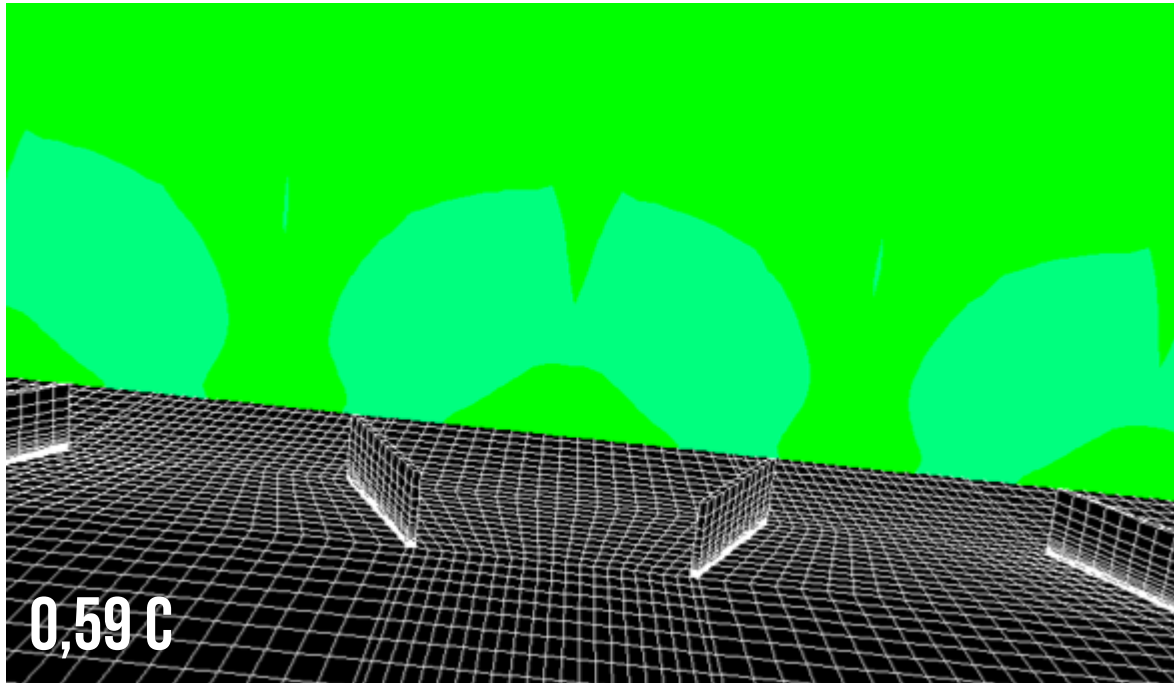


Figura 1.17. Contornos de presión (vista detalle) a distintos ángulos de ataque





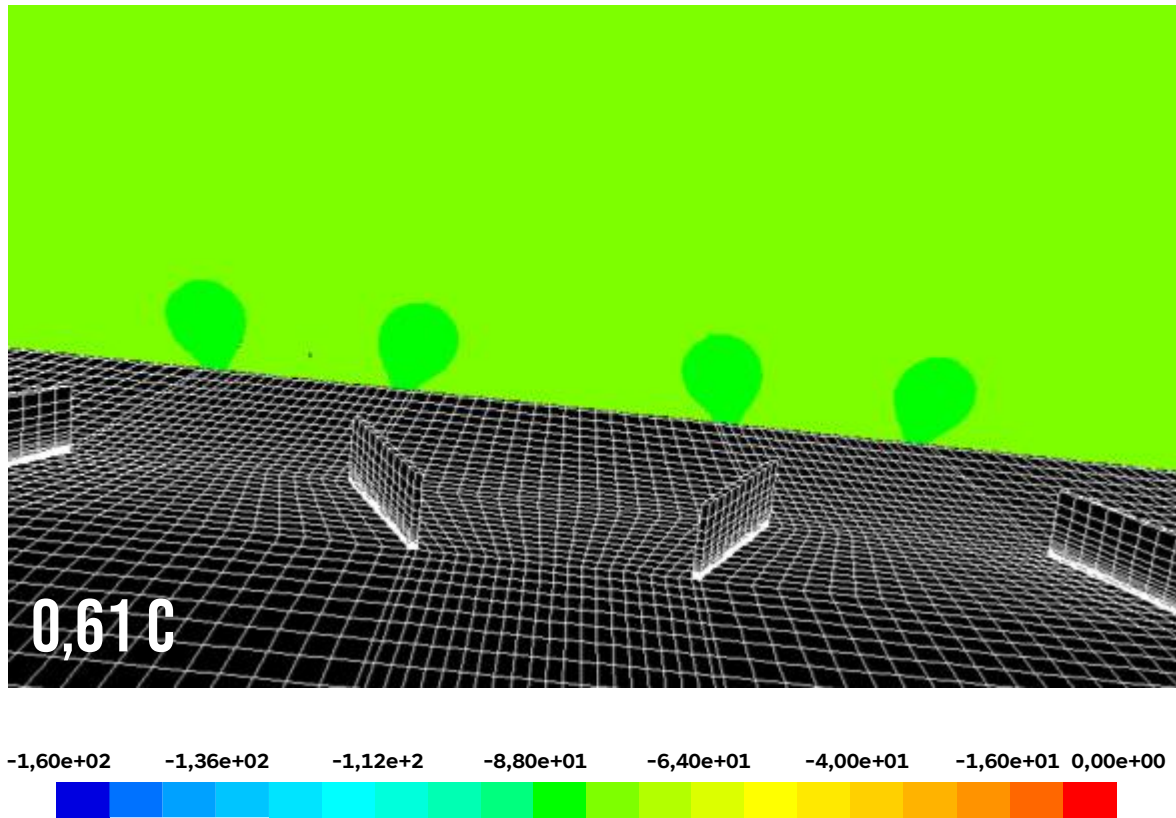
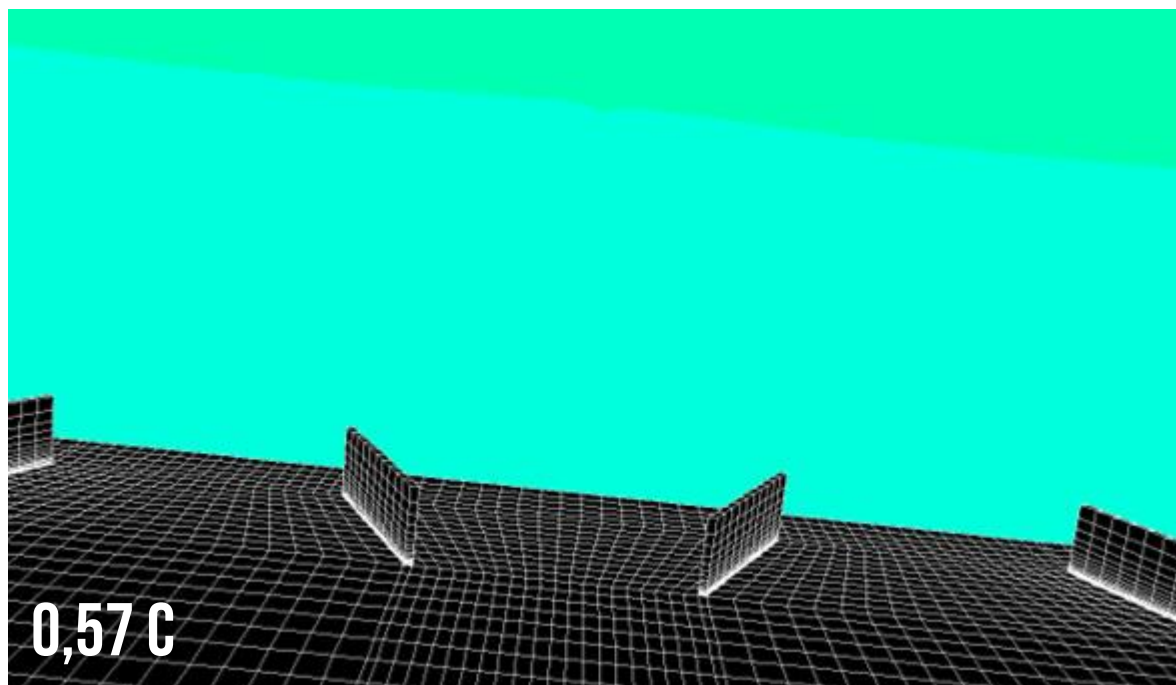
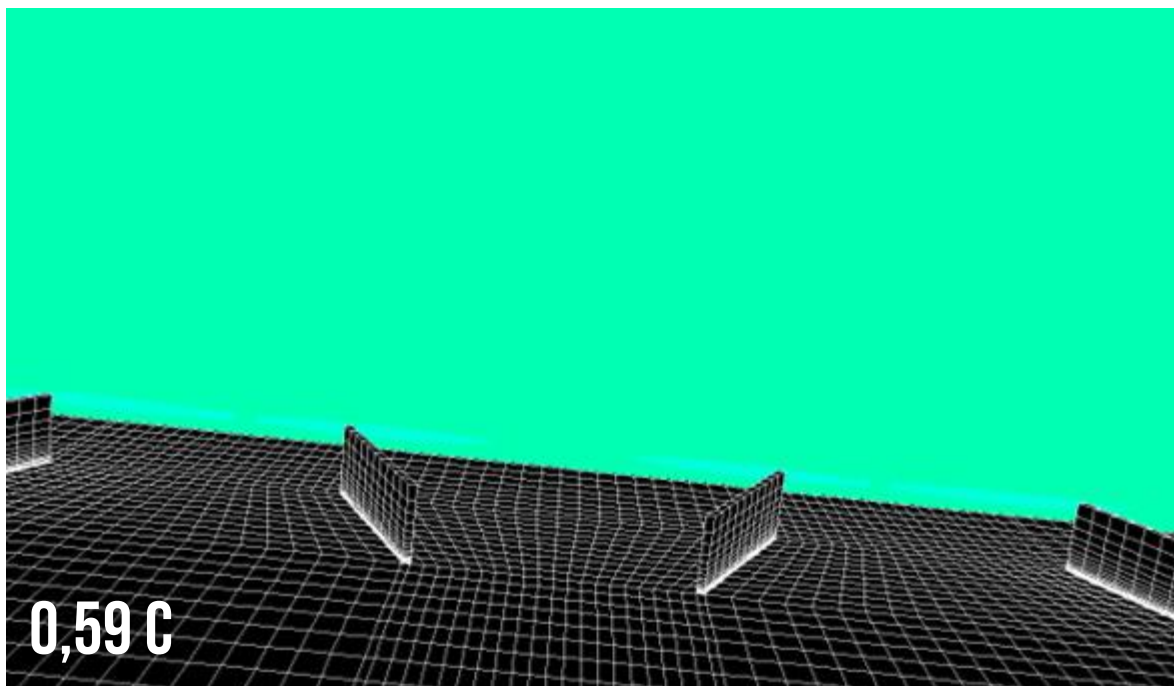
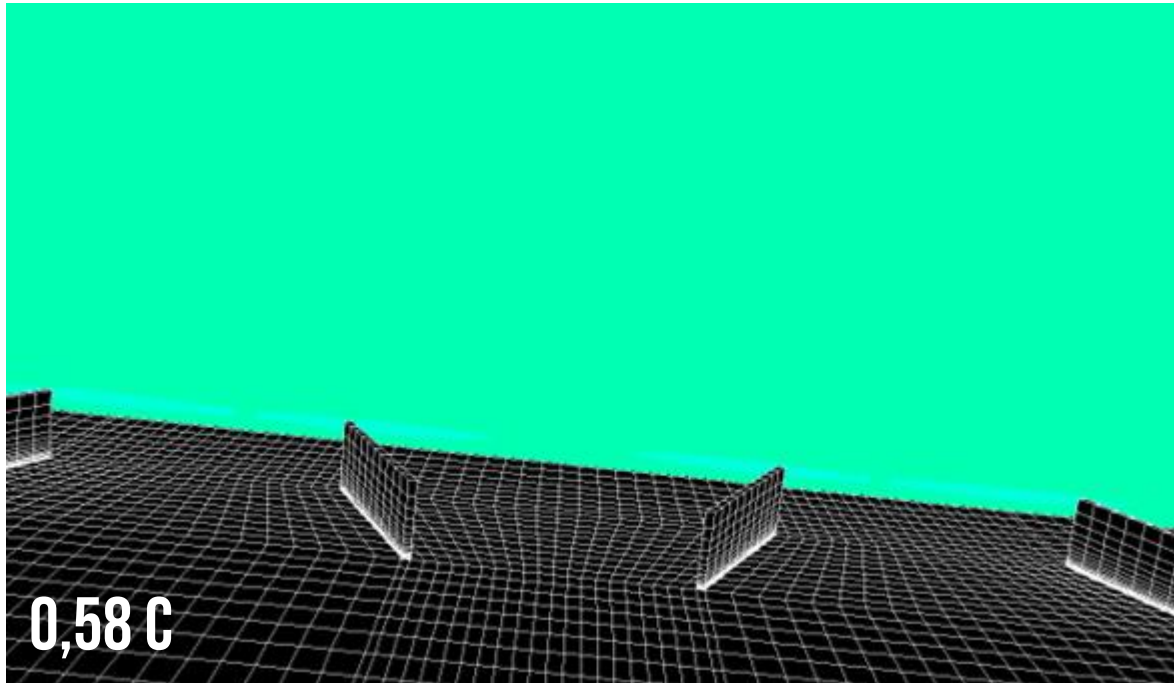


Figura 1.18. Contornos de presión detrás del VG con un ángulo de ataque de 0 grados





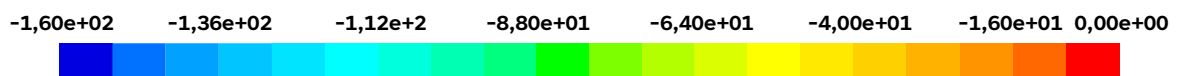
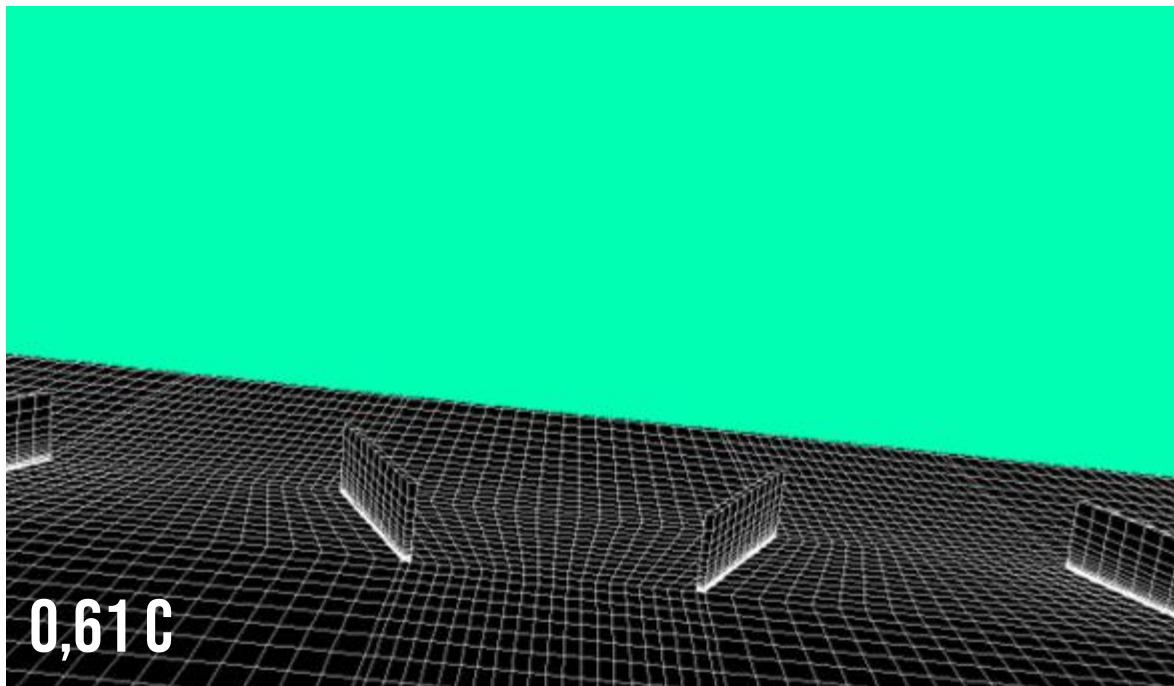
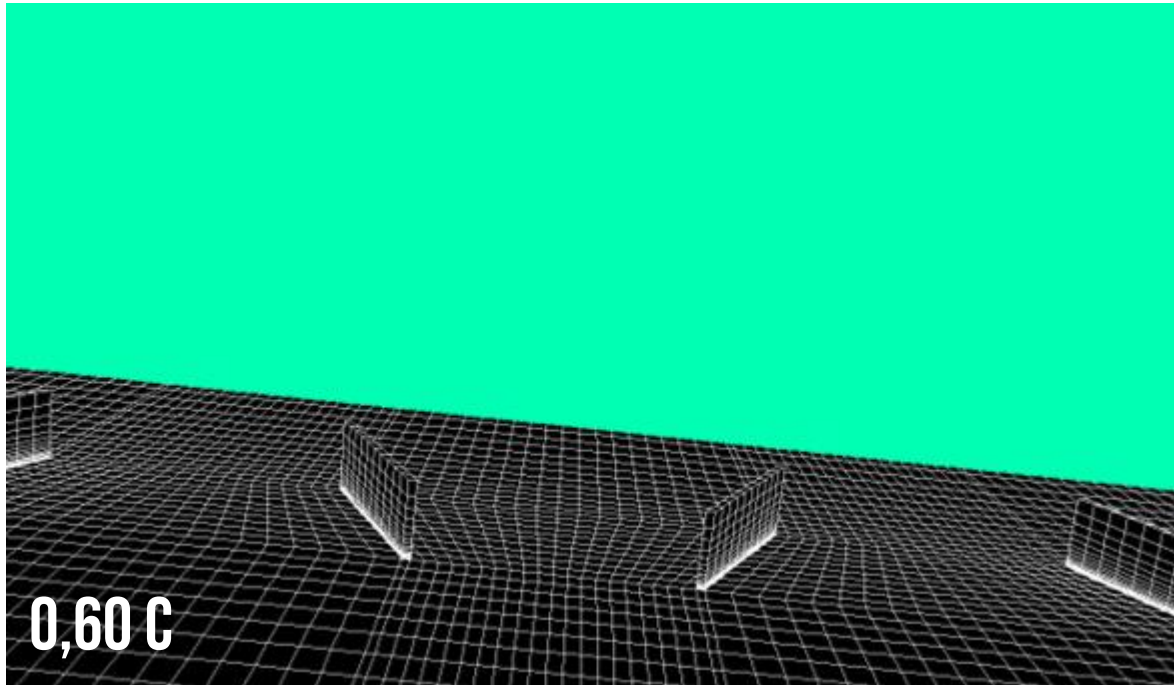
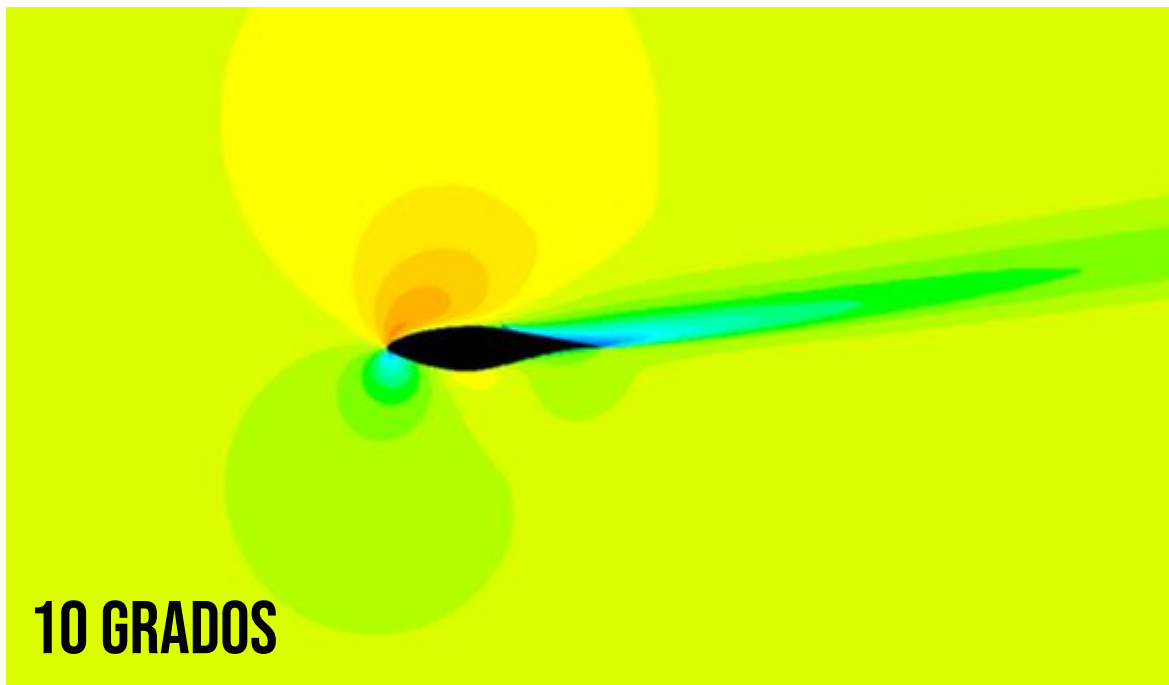
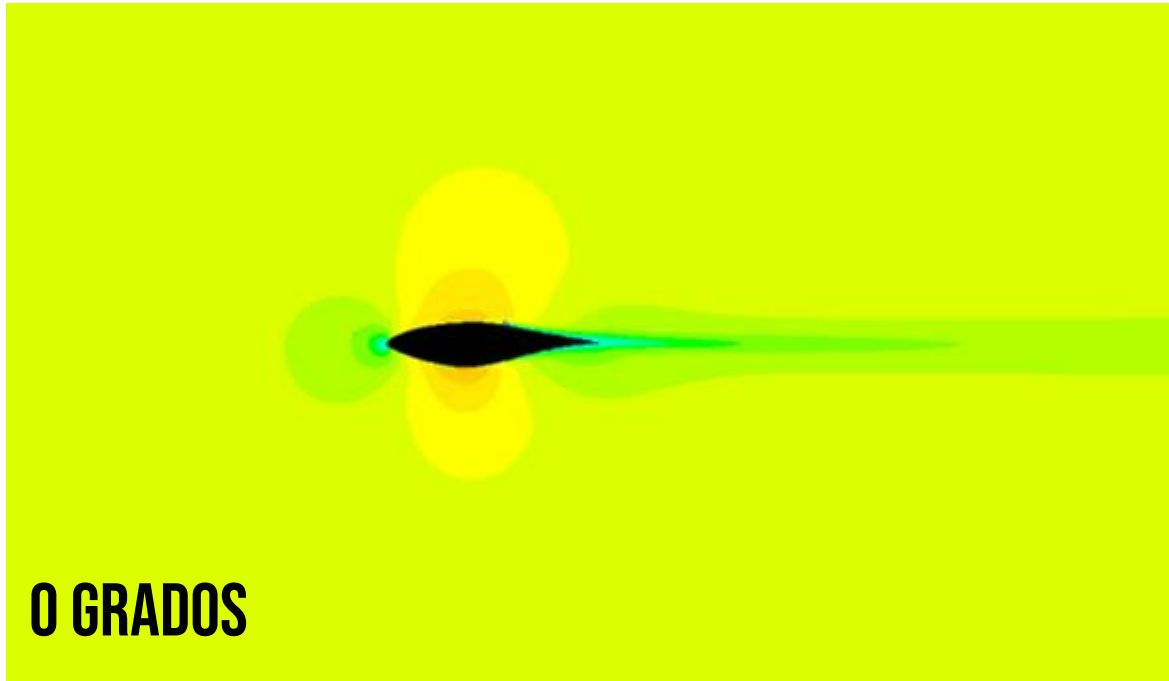
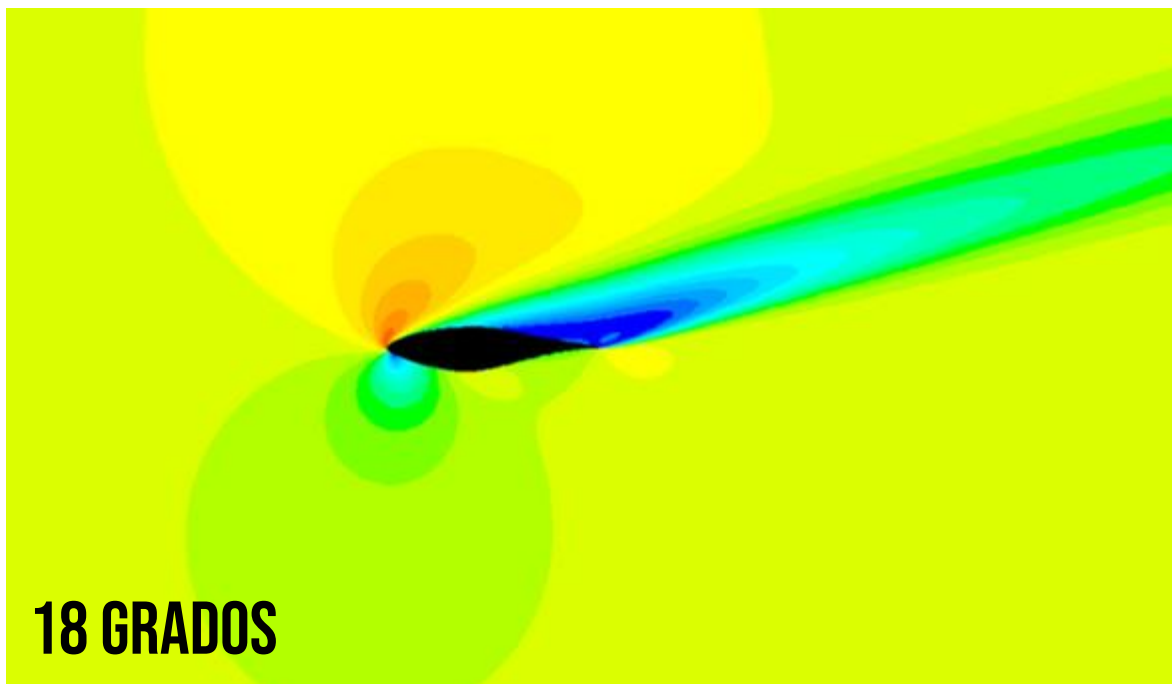
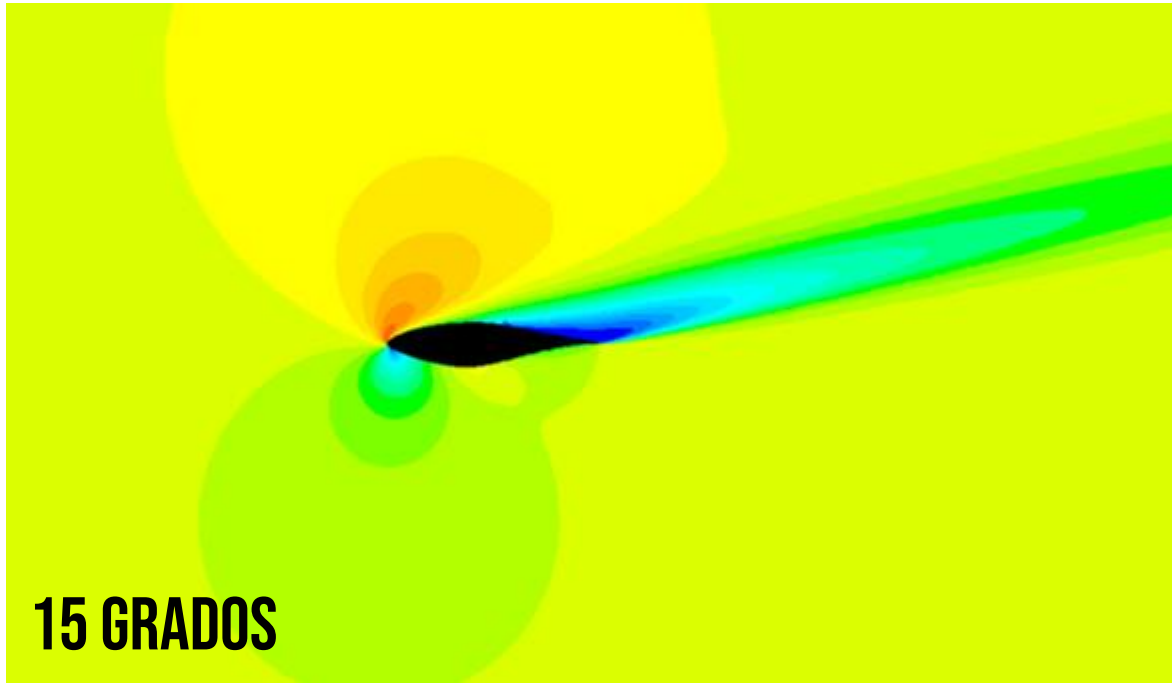


Figura 1.19. Contornos de presión detrás del VG con un ángulo de ataque de 18 grados

1.2.4. Caso 3





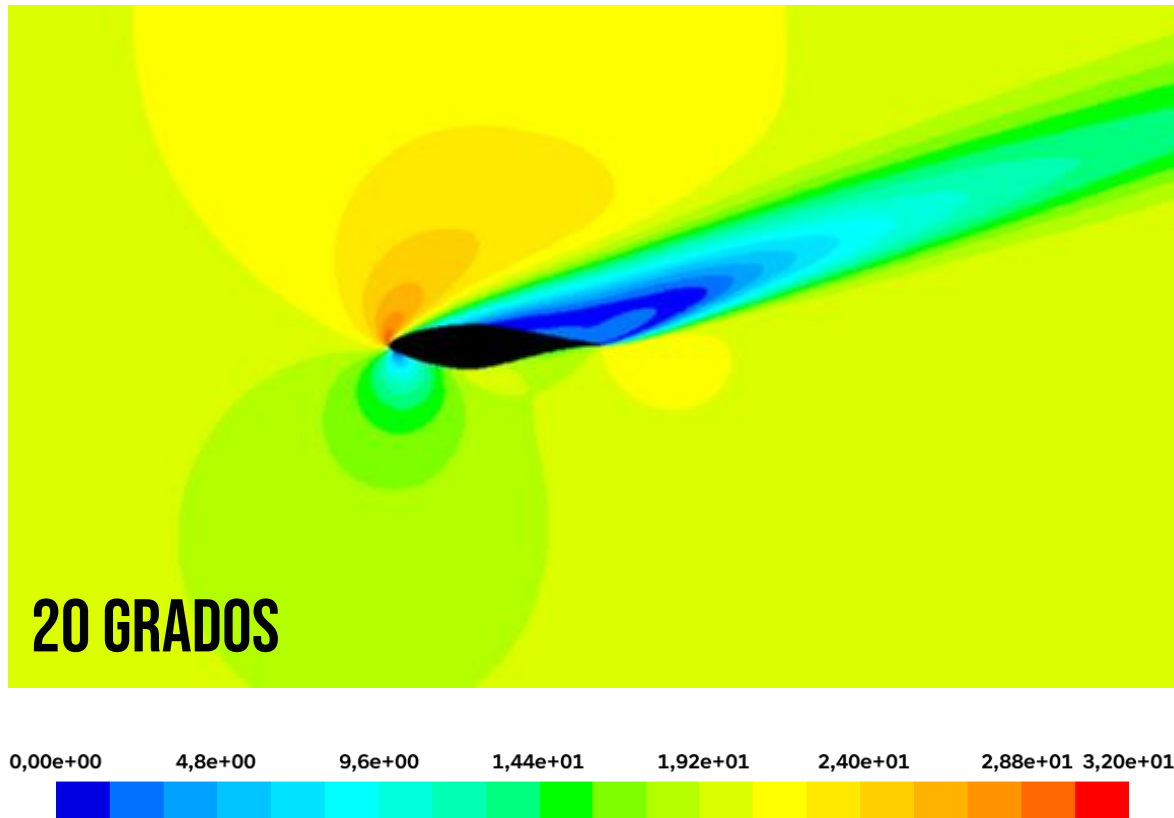
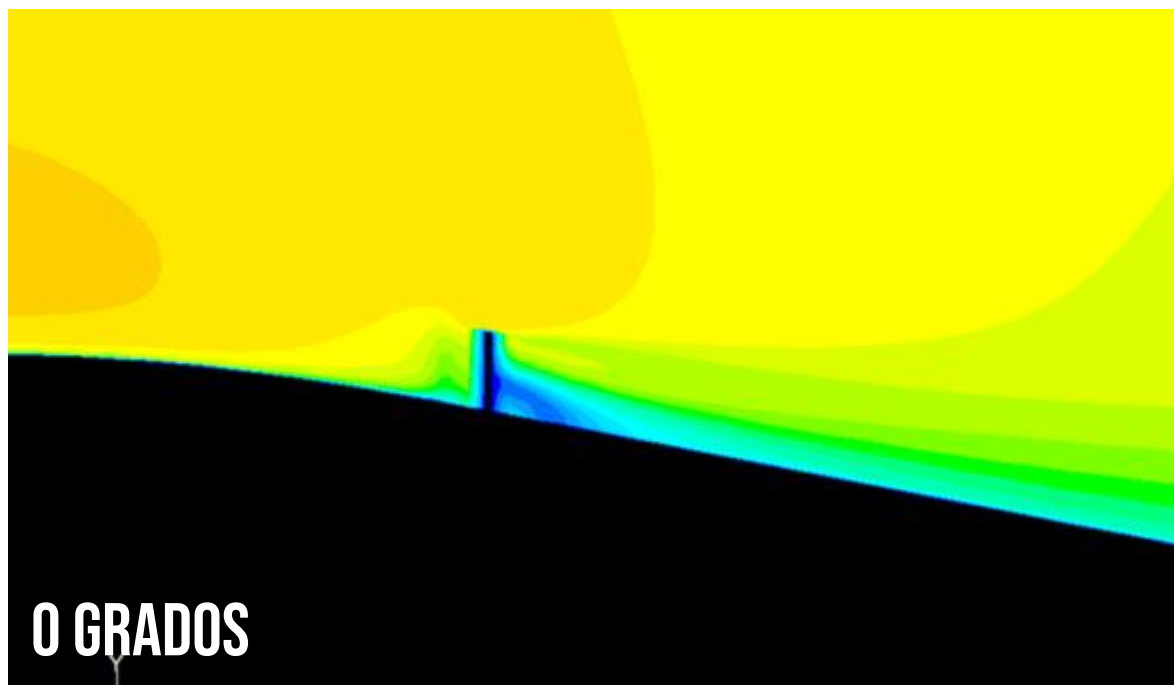
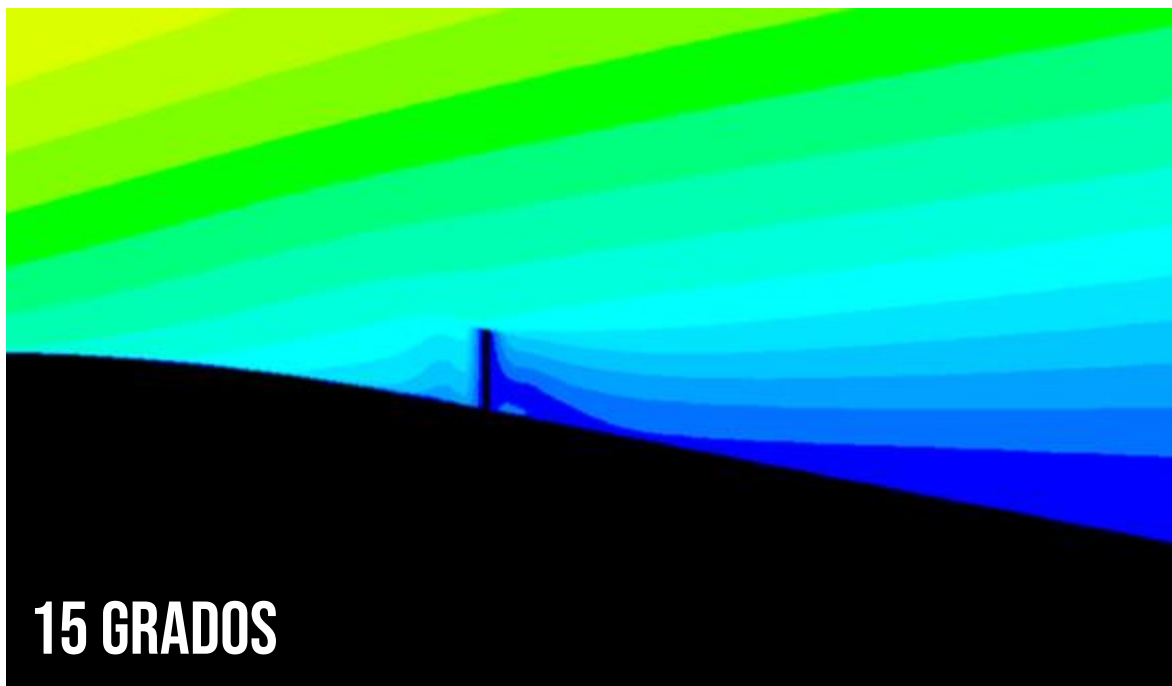
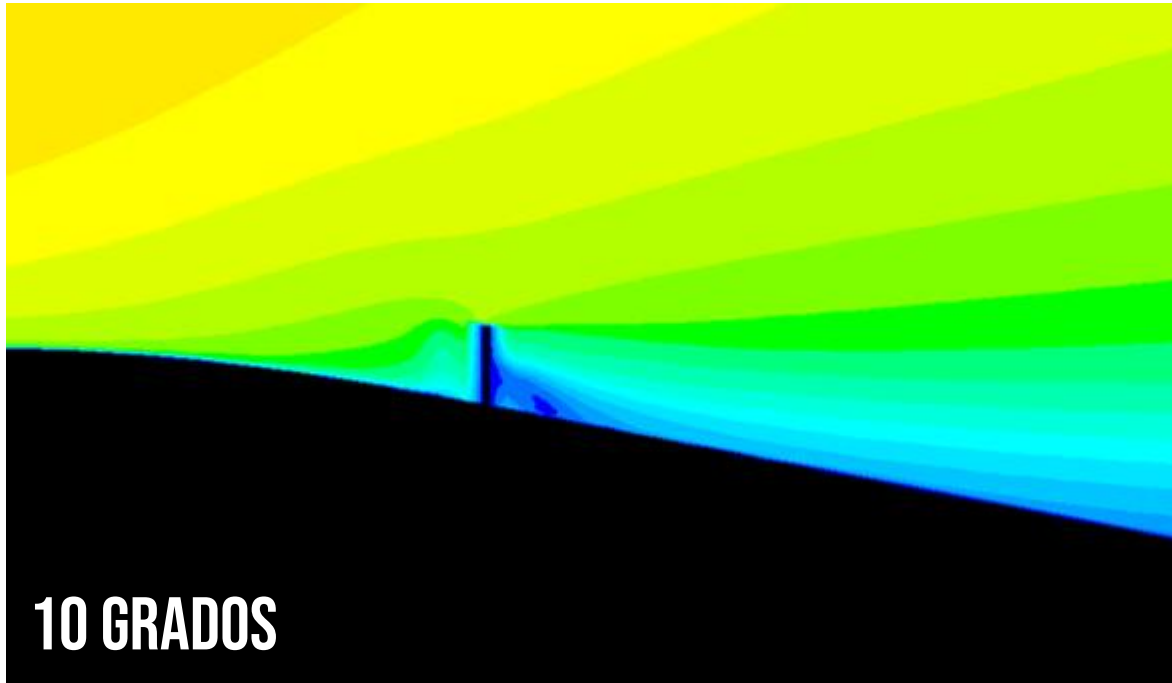


Figura 1.20. Contornos de velocidad (vista general) para diferentes ángulos de ataque





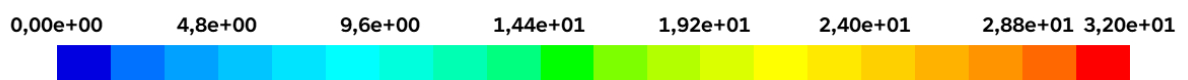
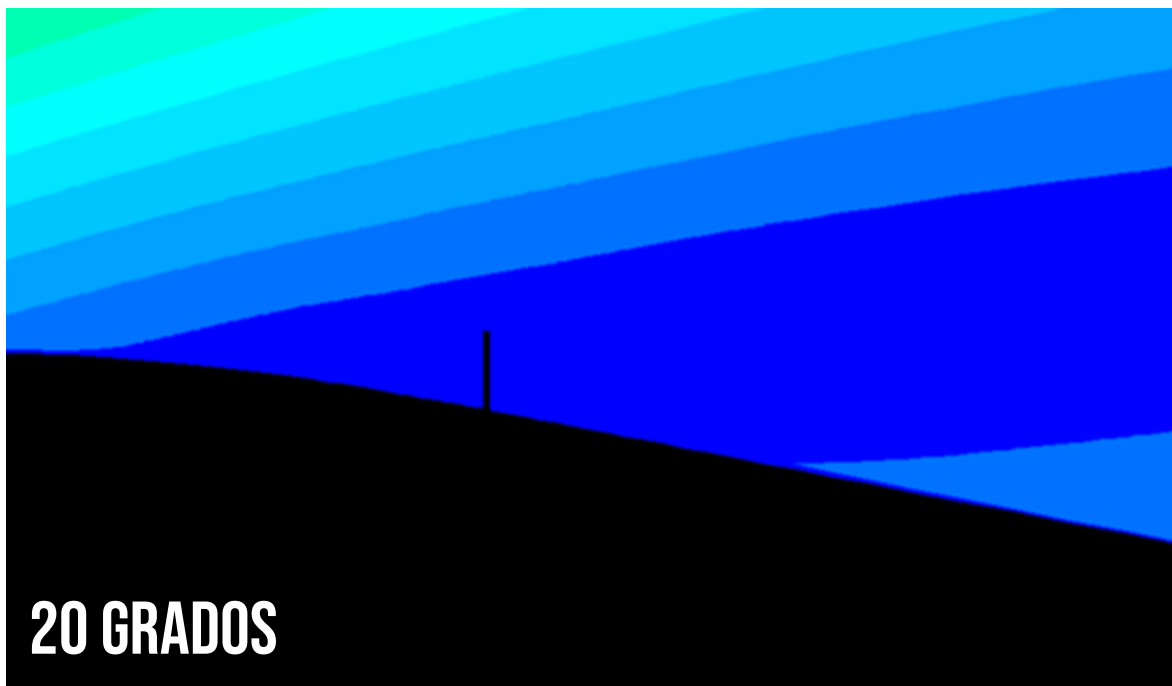
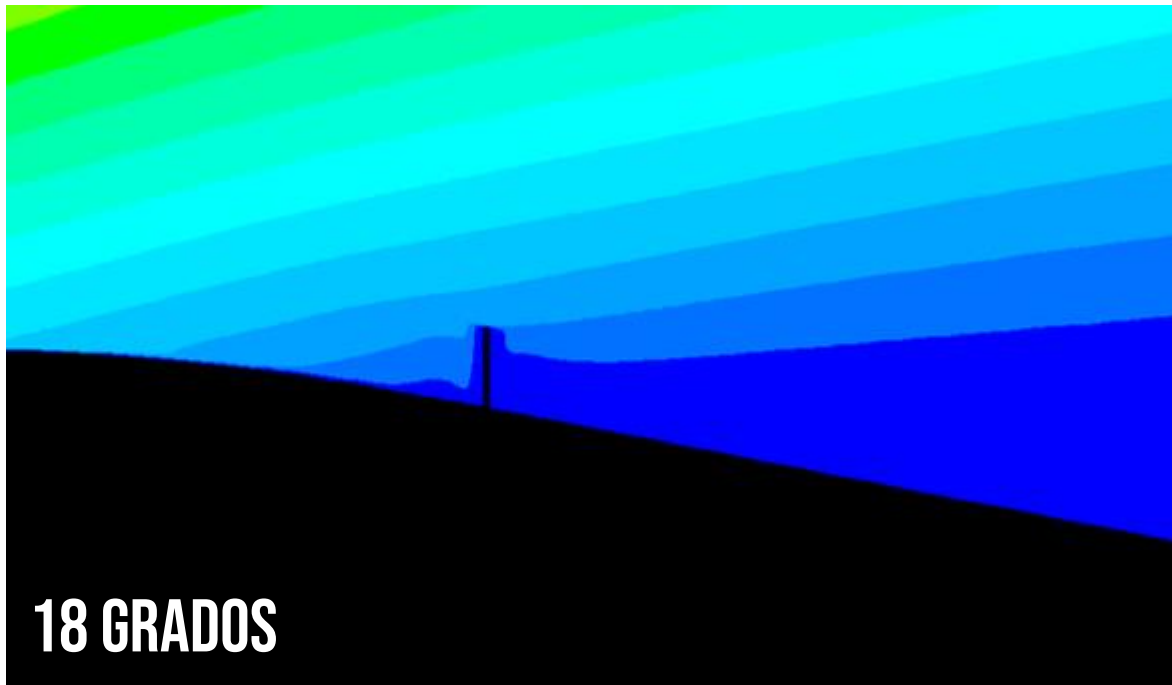
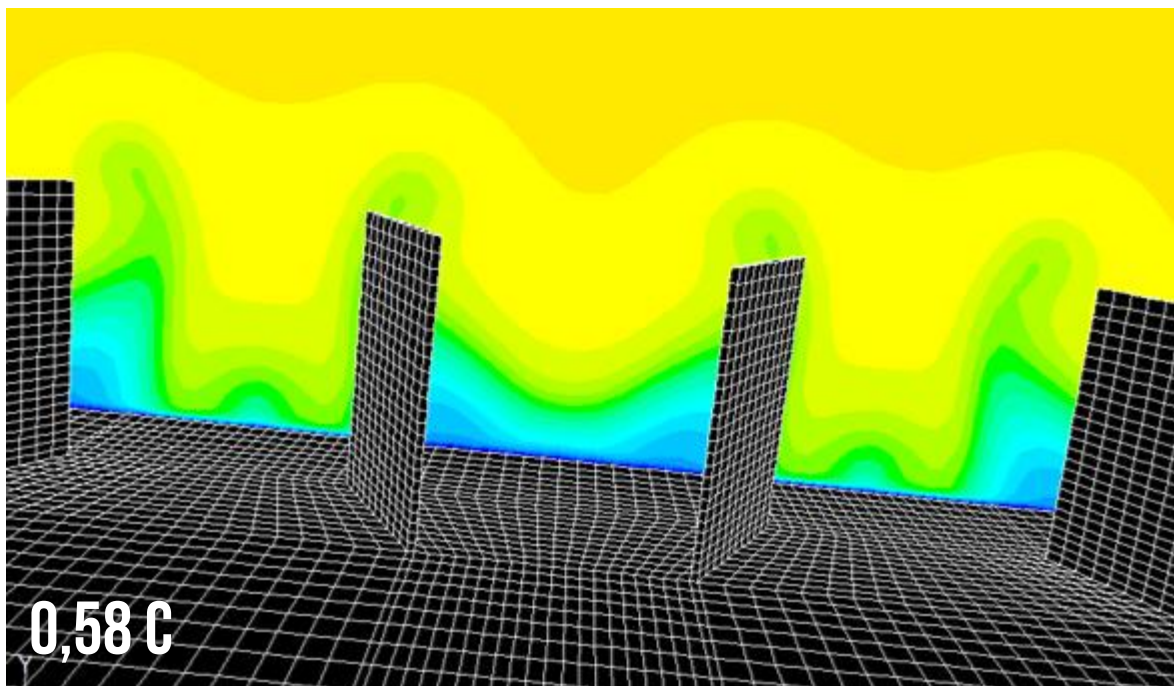
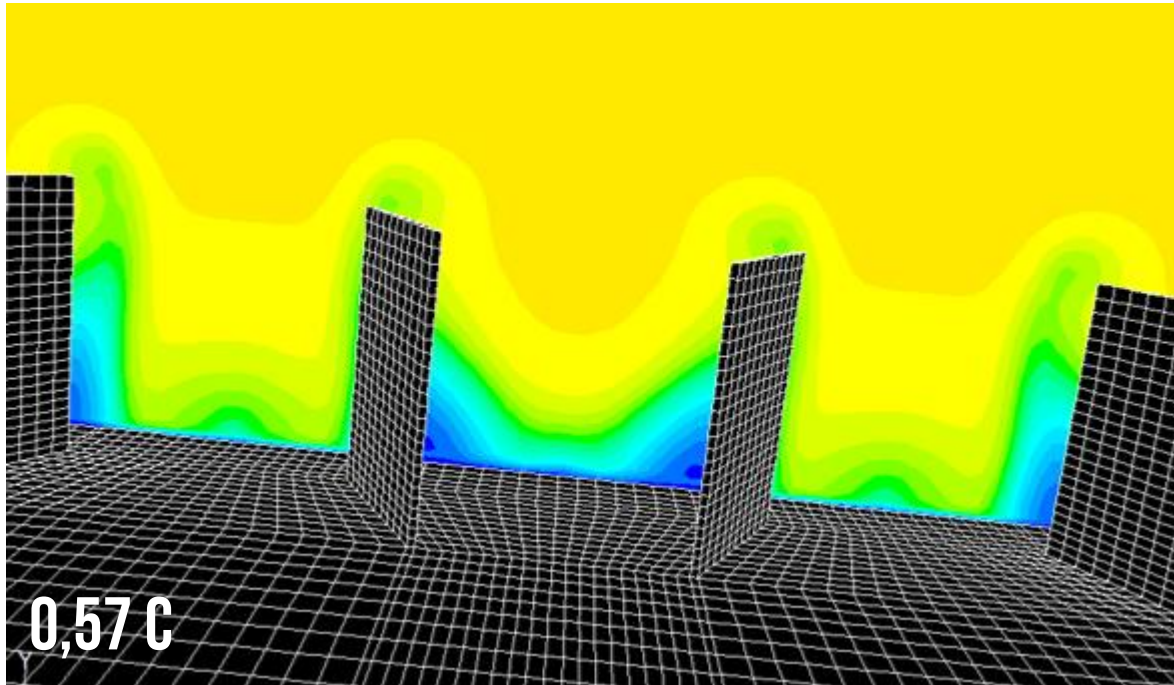
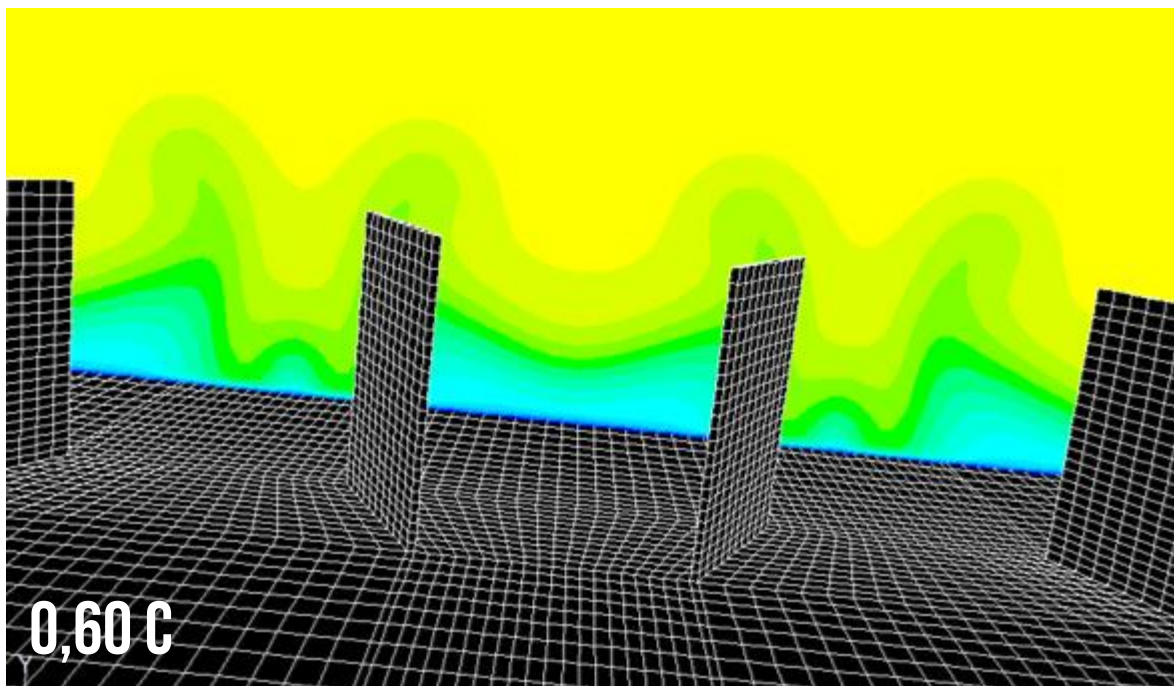
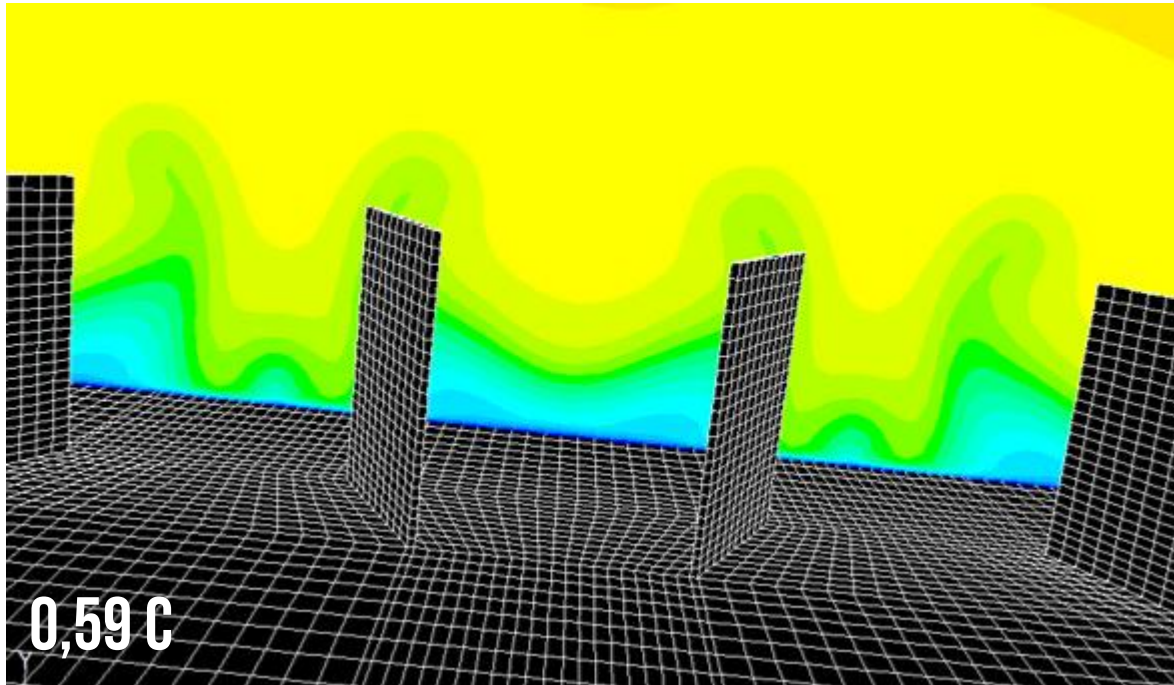


Figura 1.21. Contornos de velocidad (vista detalle) para diferentes ángulos de ataque





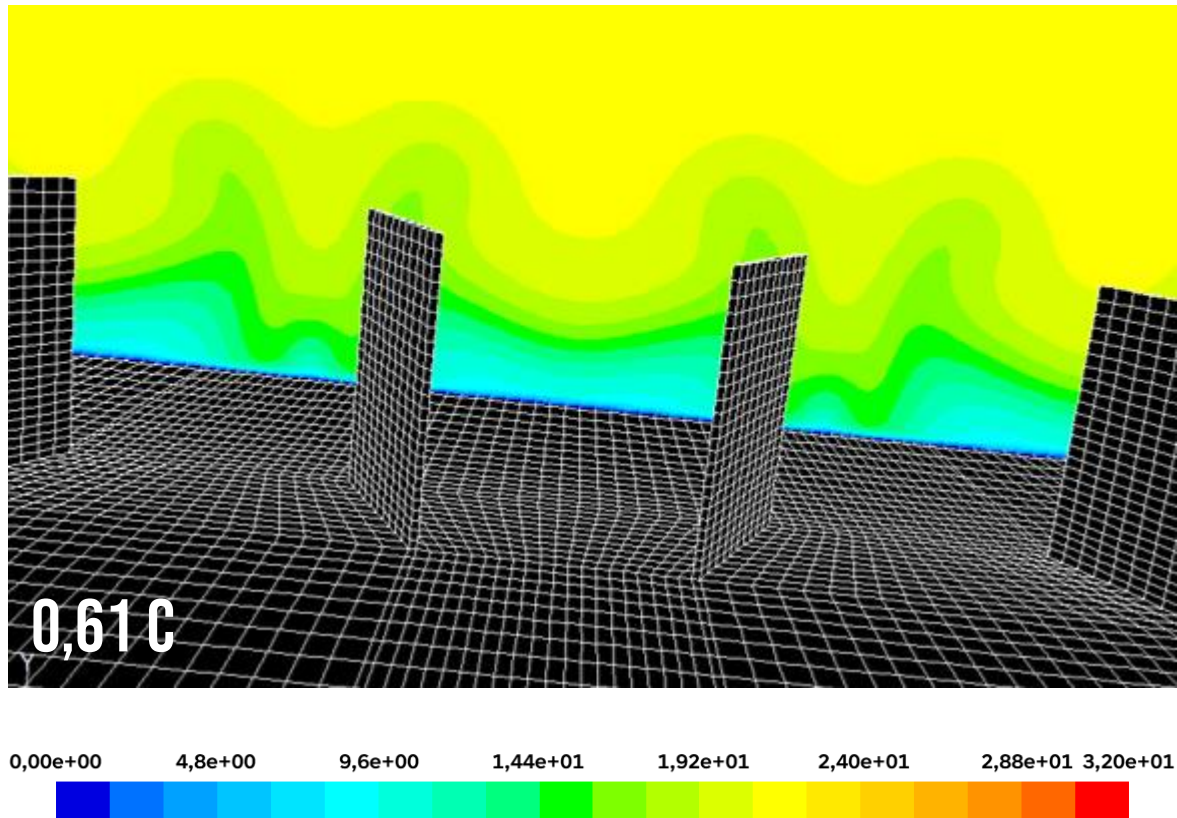
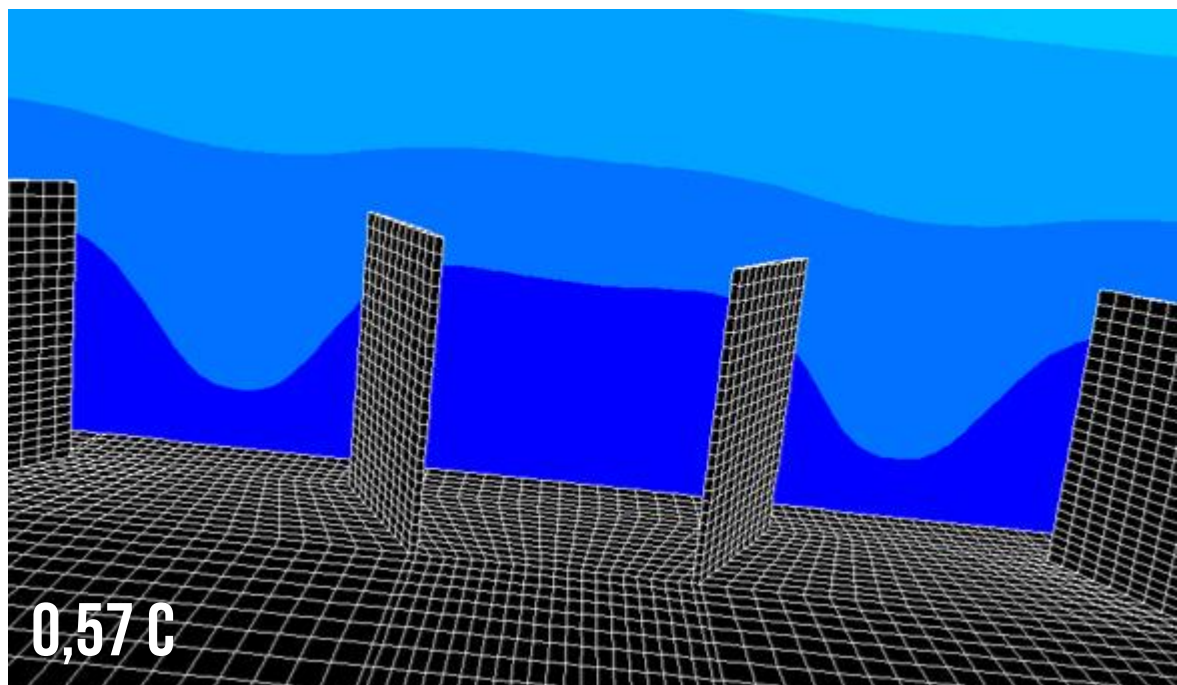
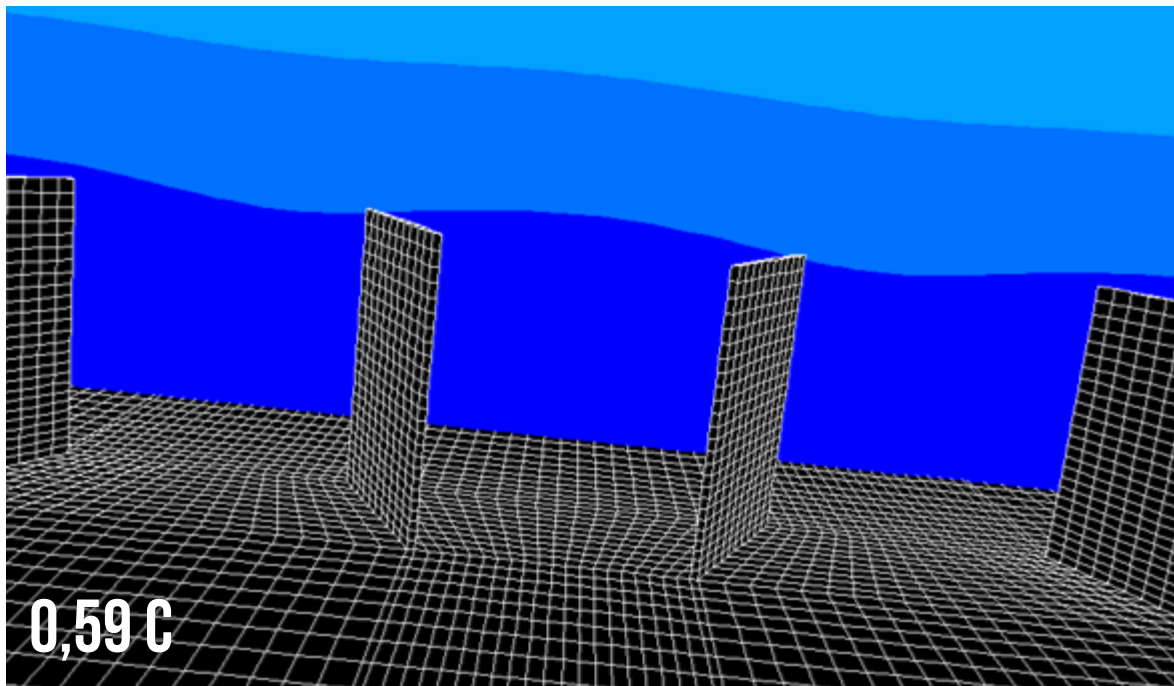
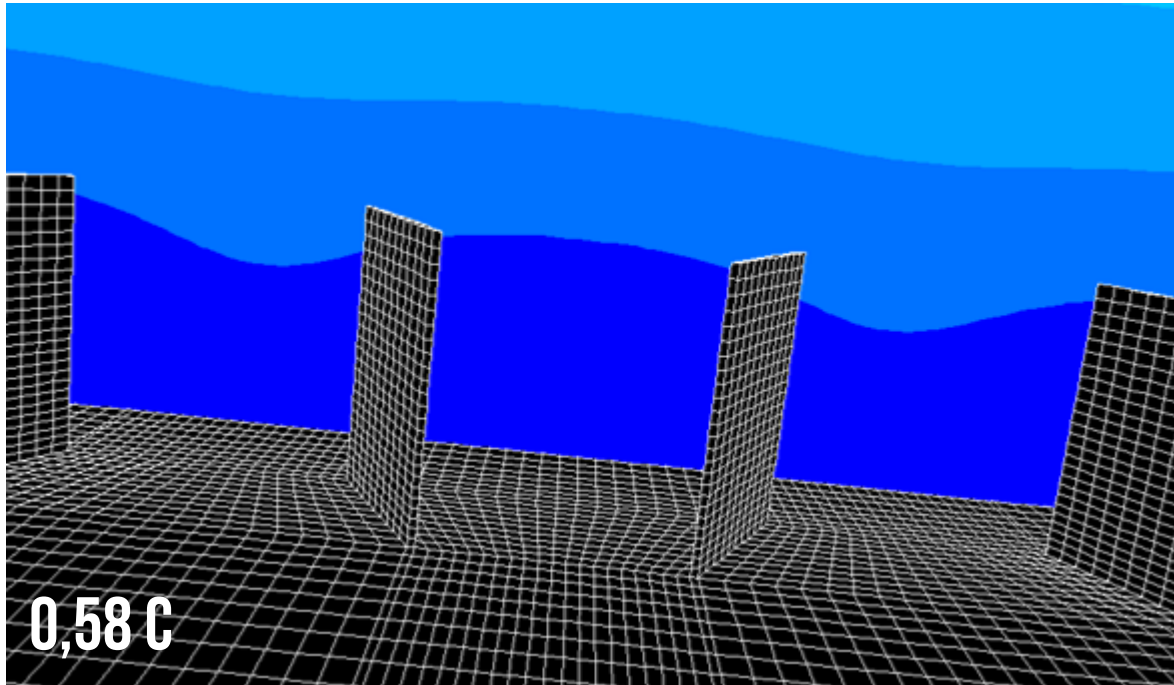


Figura 1.22. Contornos de velocidad detrás del VG con un ángulo de ataque de 0 grados





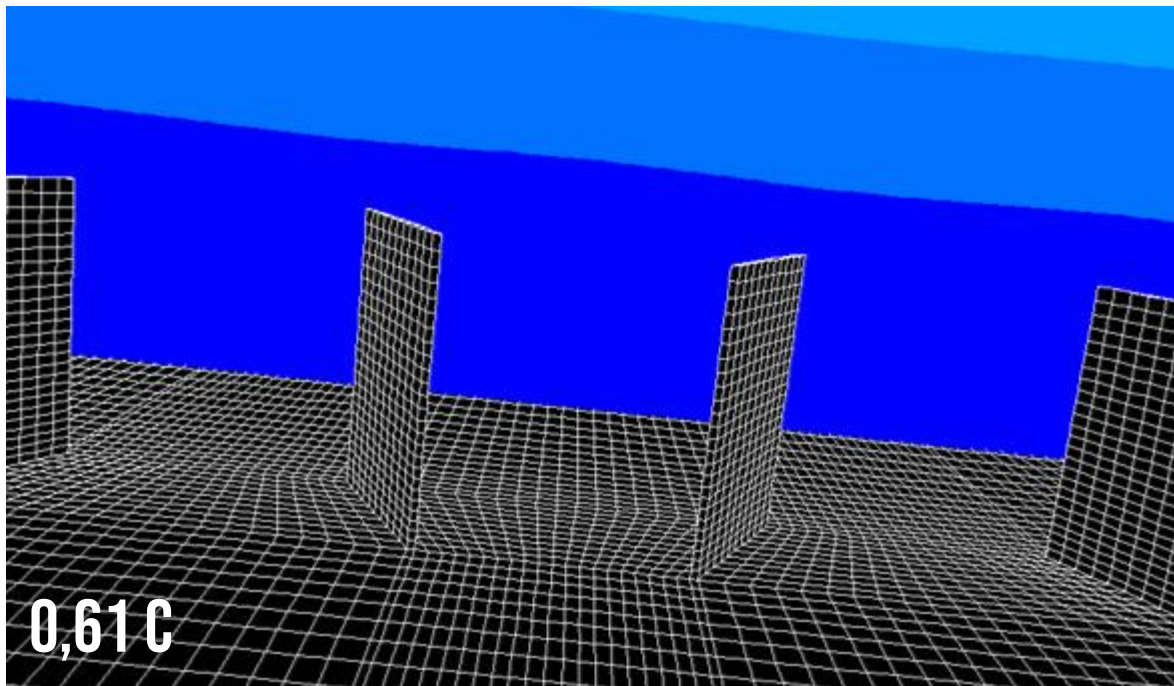
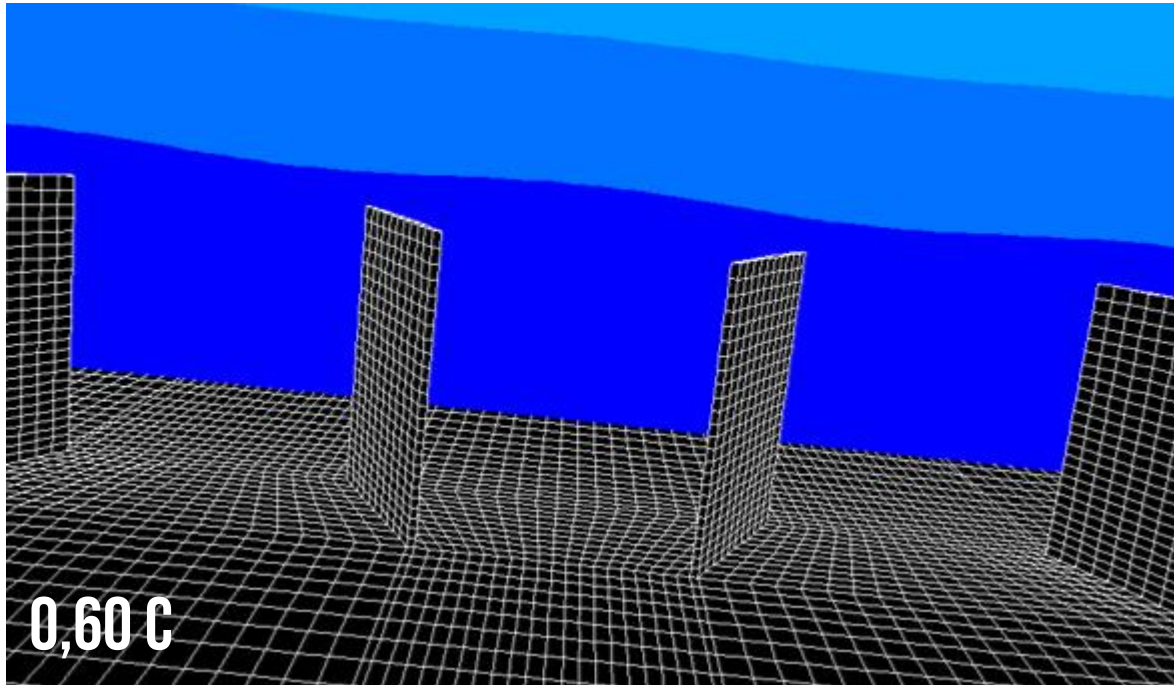
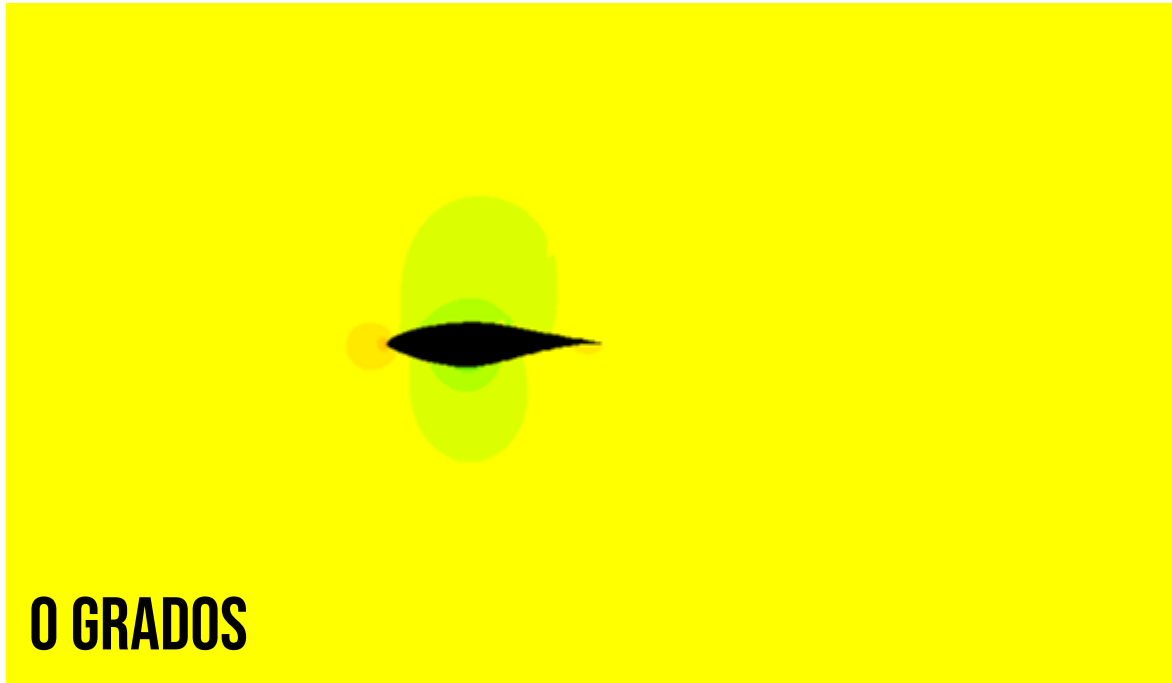
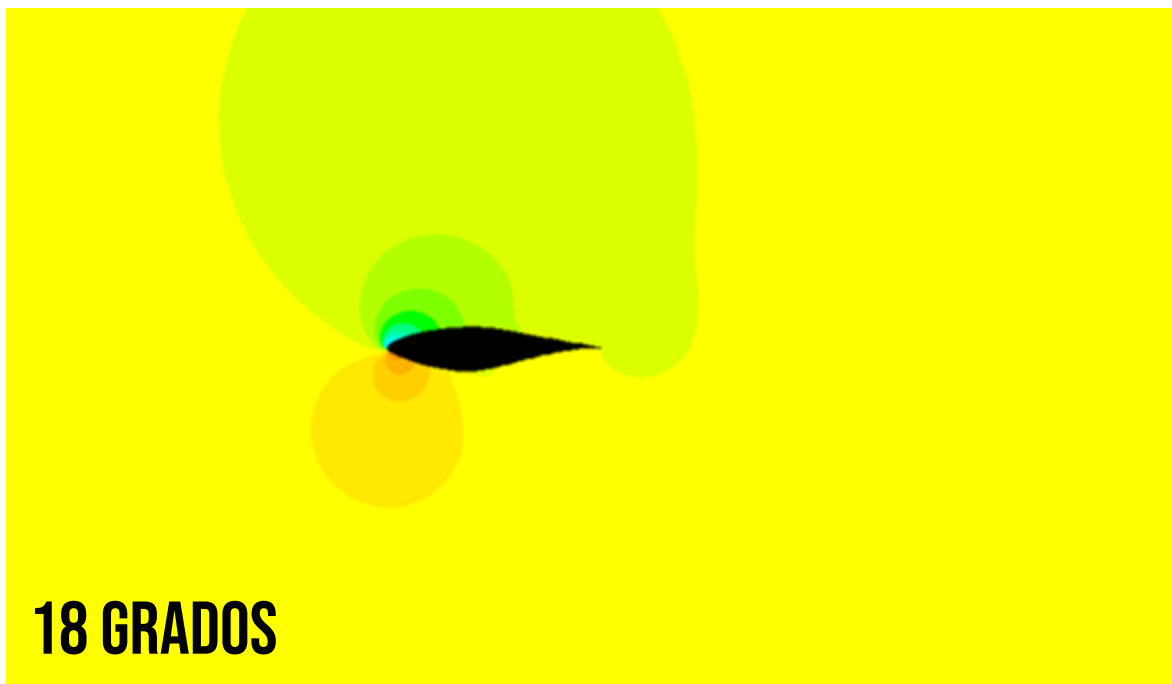


Figura 1.23. Contornos de velocidad detrás del VG con un ángulo de ataque de 18 grados





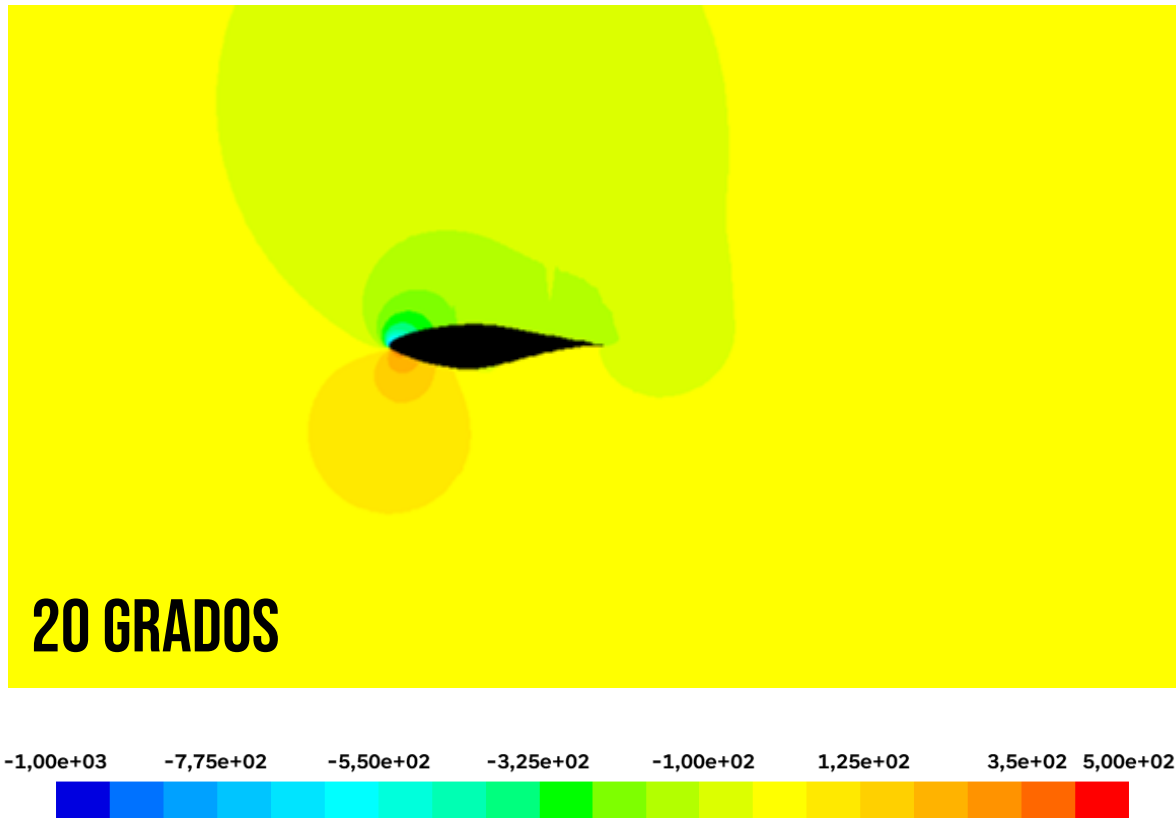
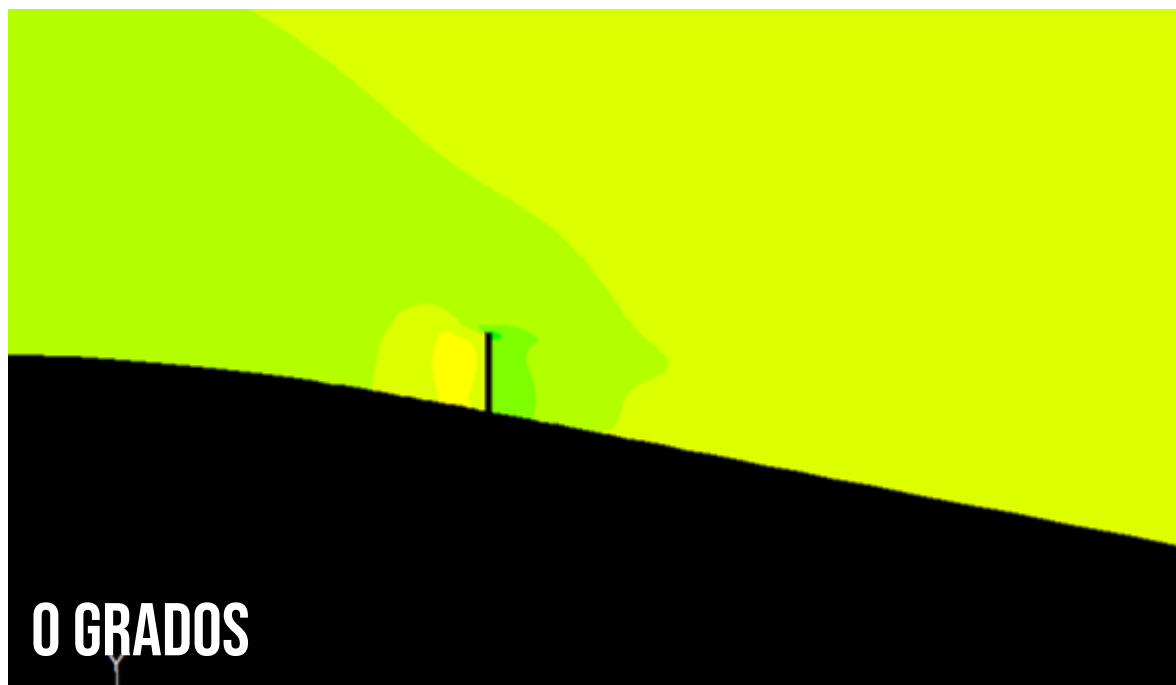
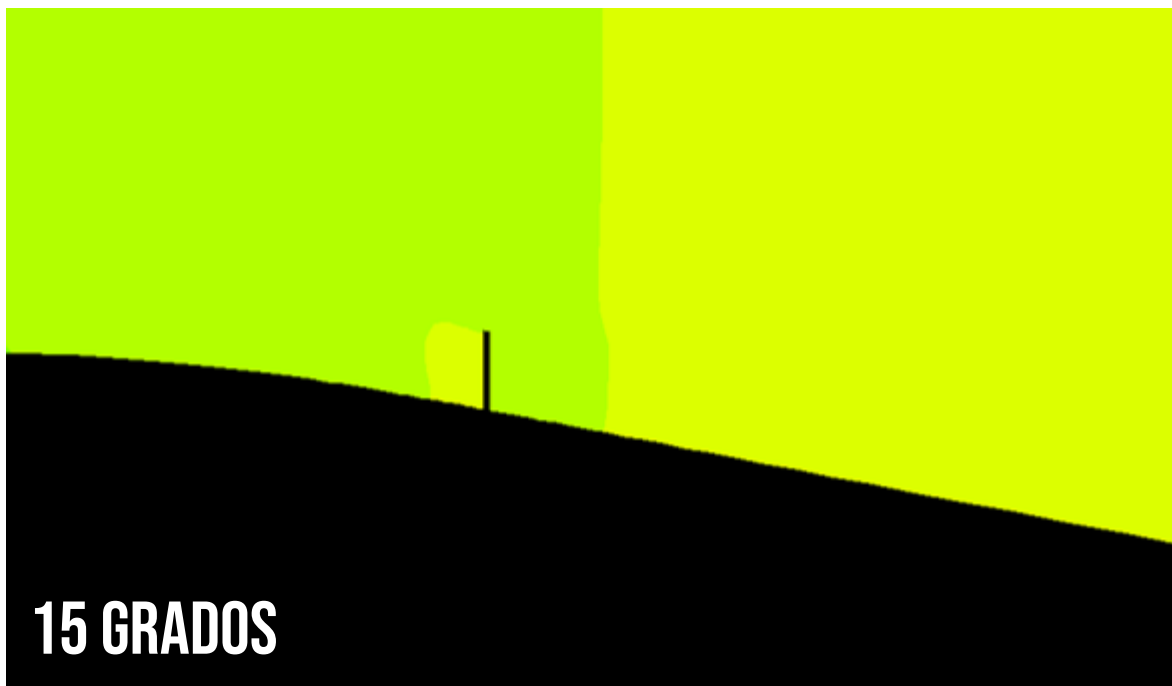
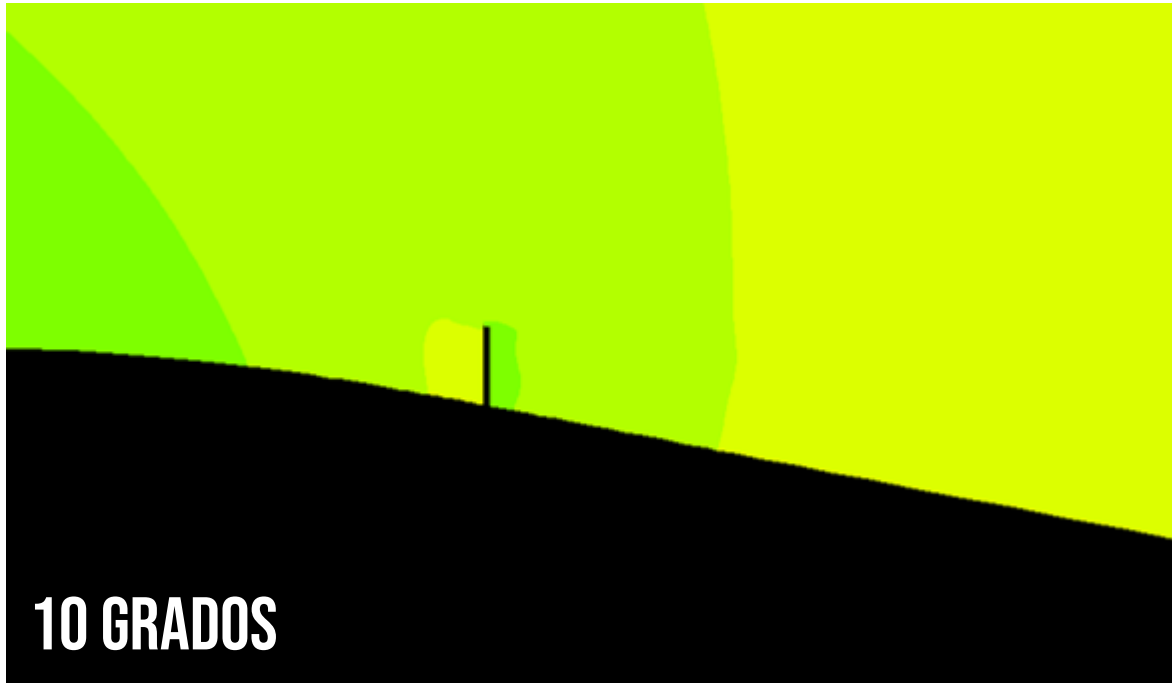


Figura 1.24- Contornos de presión (vista general) a diferentes ángulos de ataque





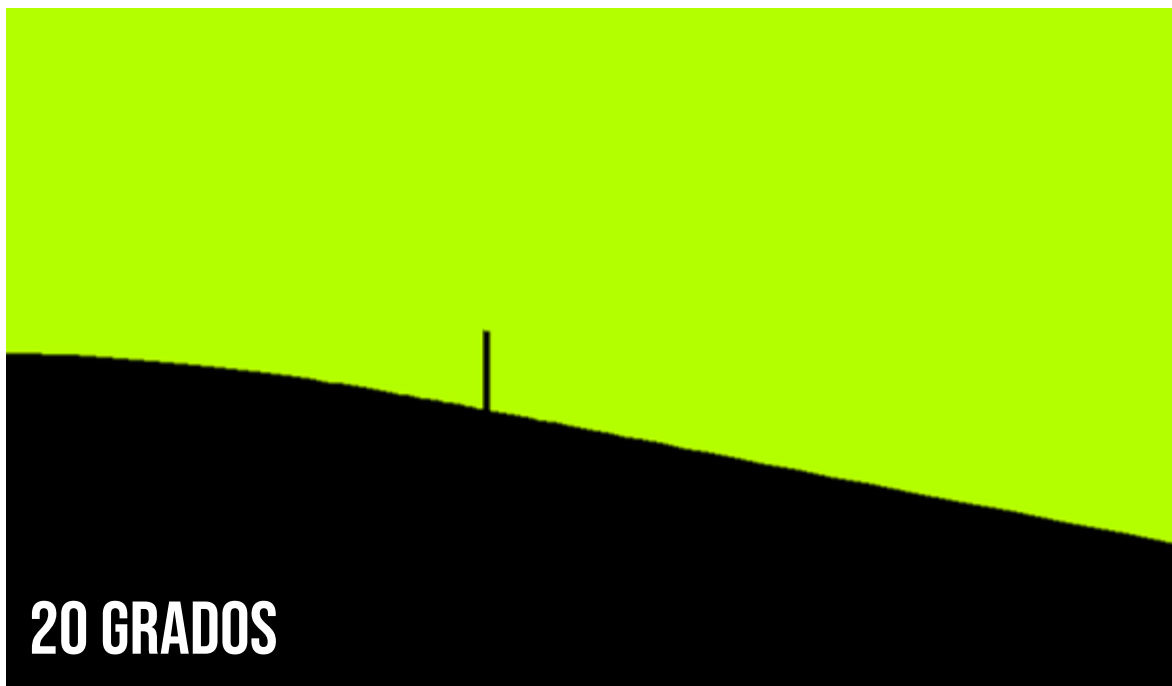
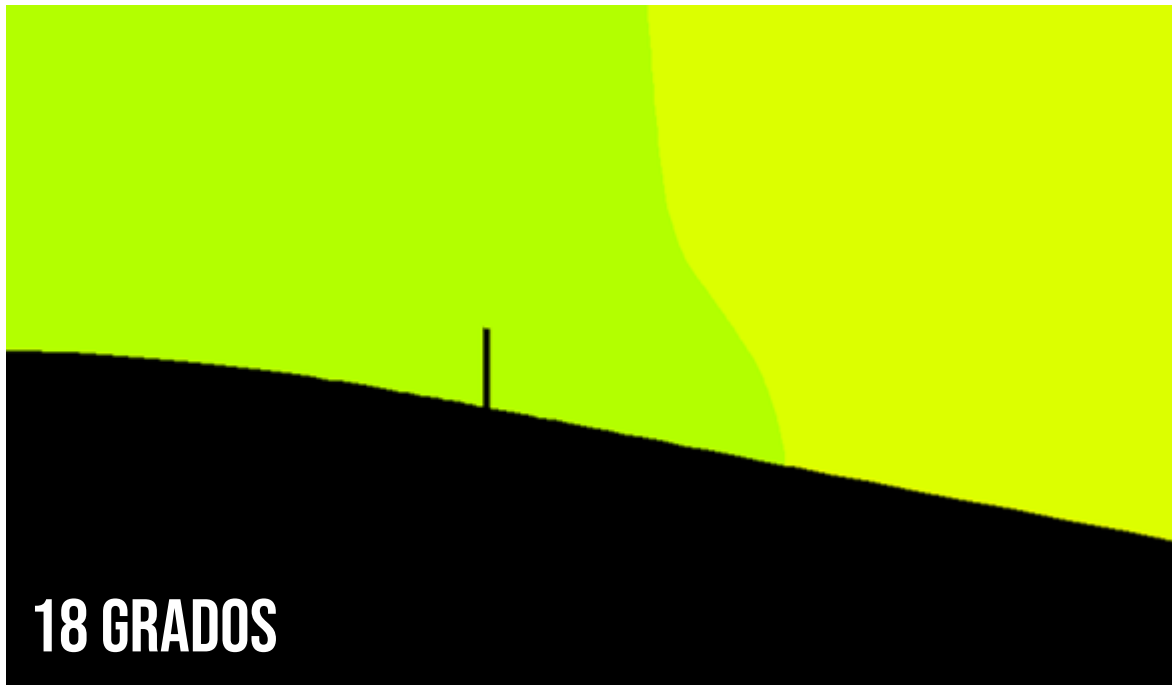
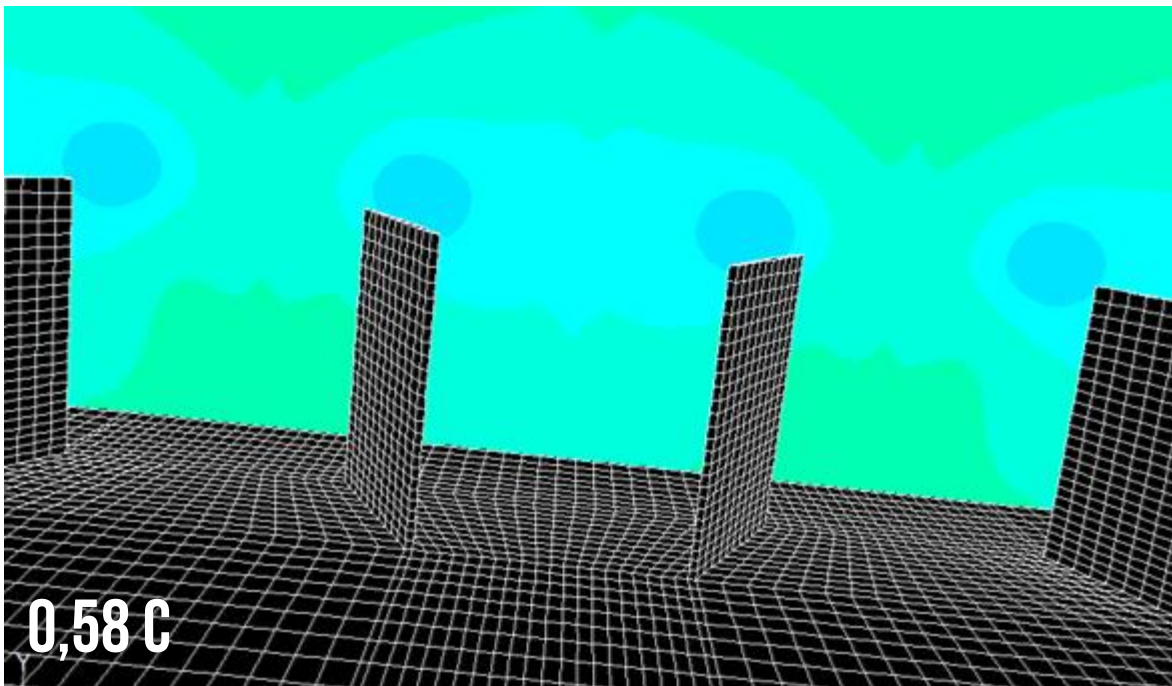
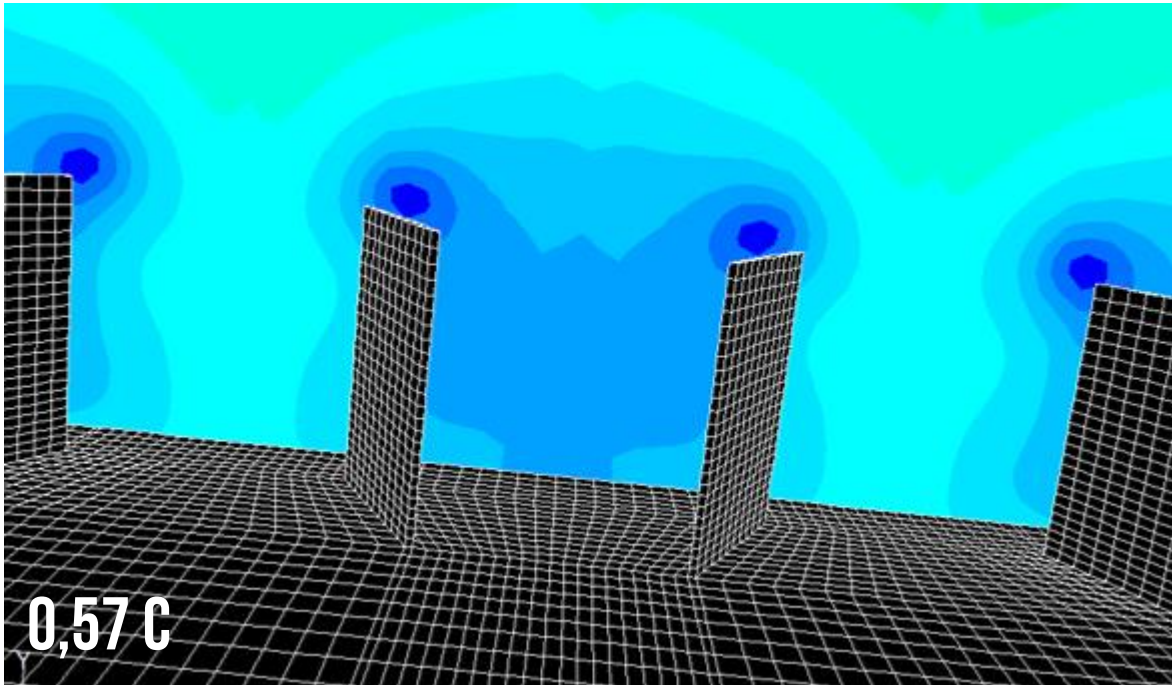
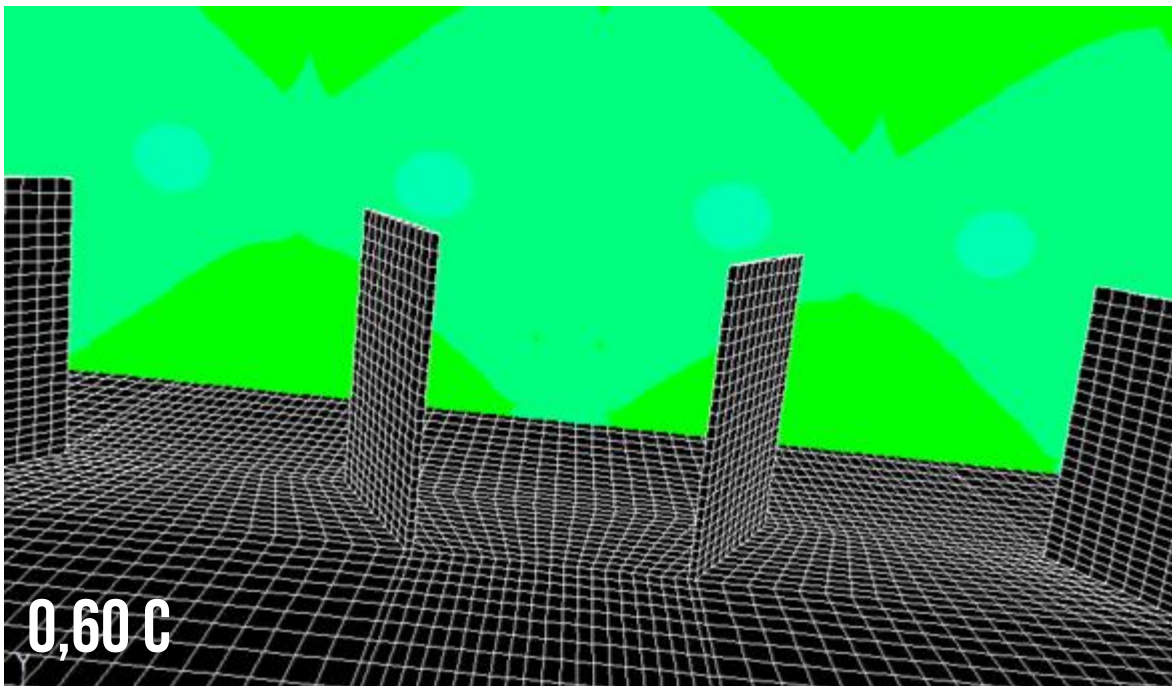
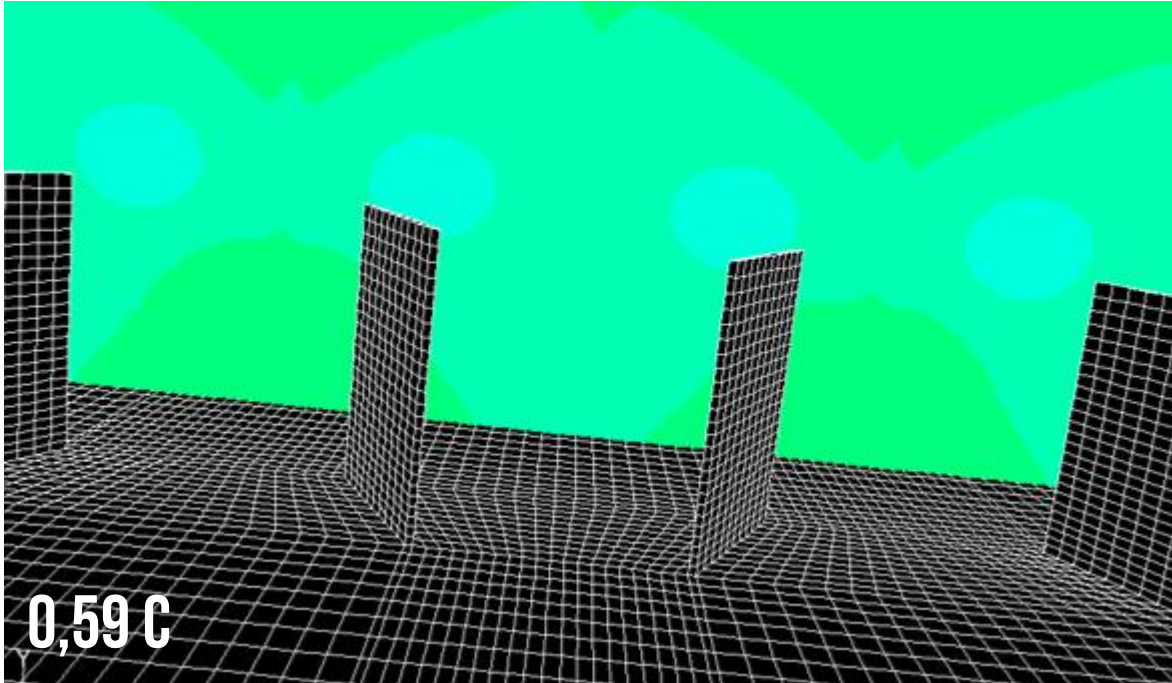


Figura 1.25. Contornos de presión (vista detalle) a distintos ángulos de ataque





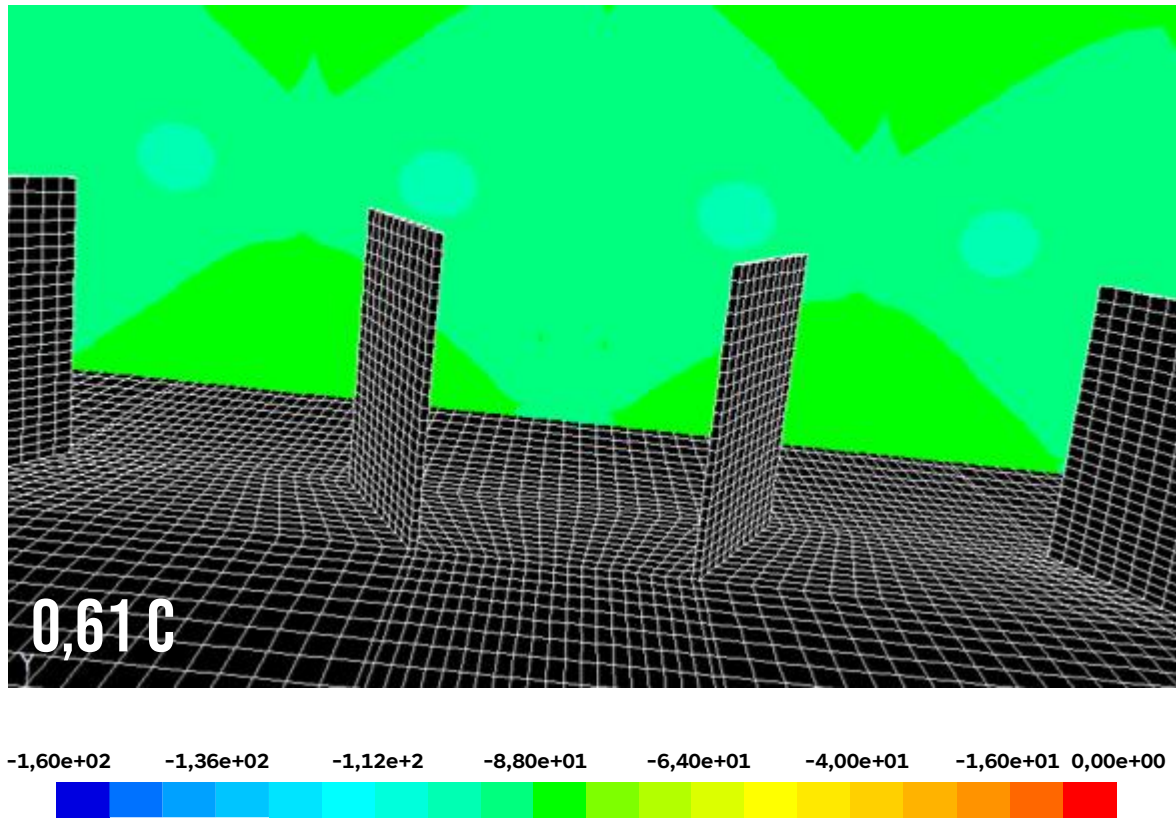
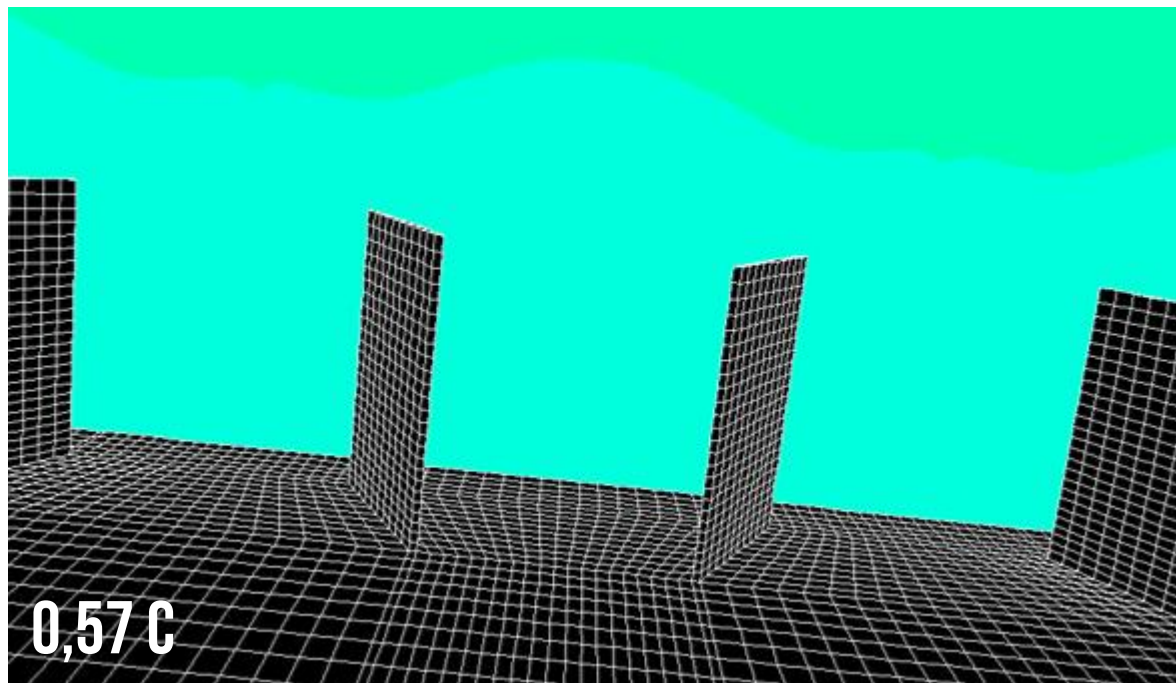
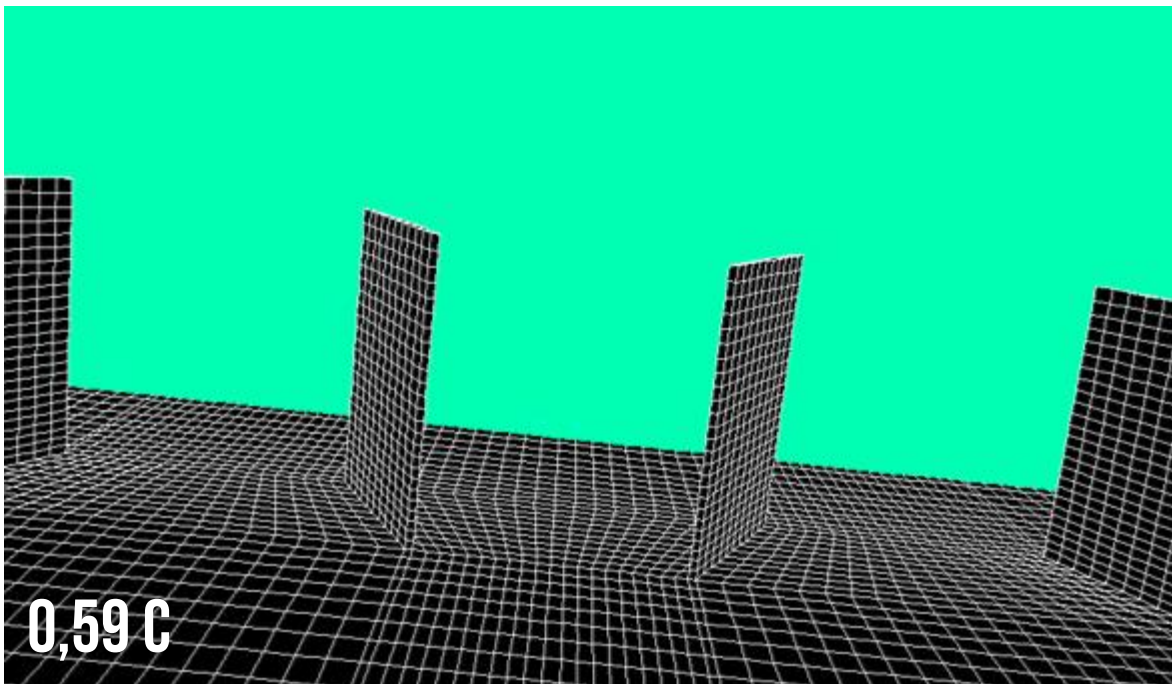
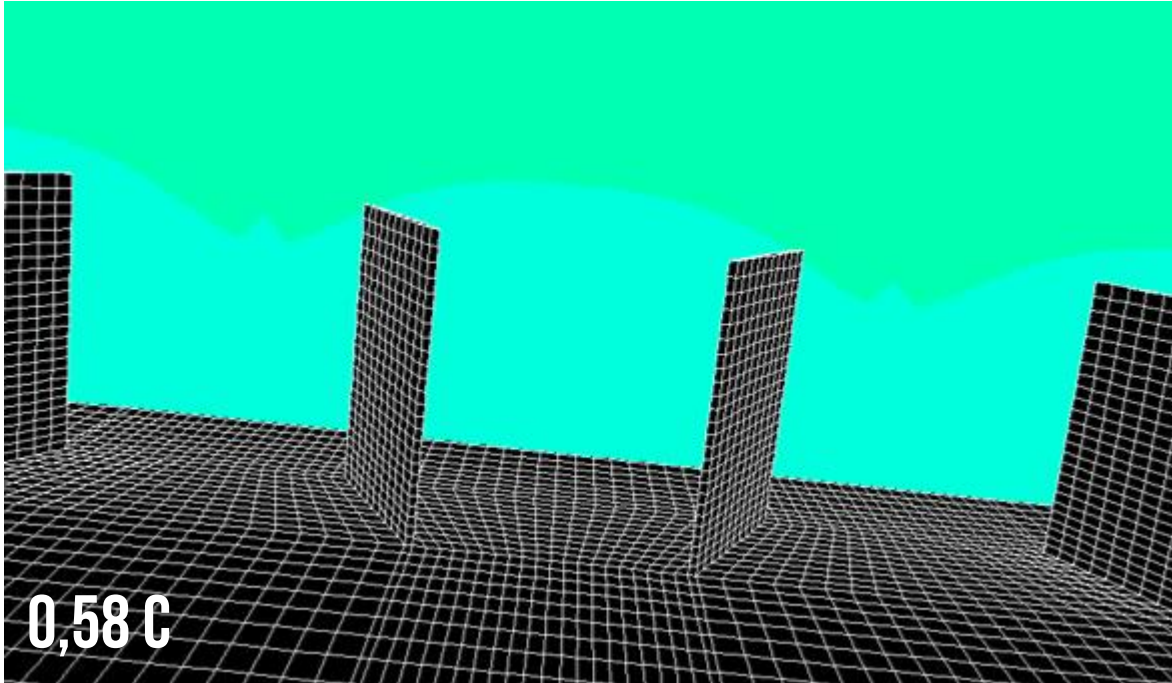


Figura 1.26. Contornos de presión detrás del VG con un ángulo de ataque de 0 grados





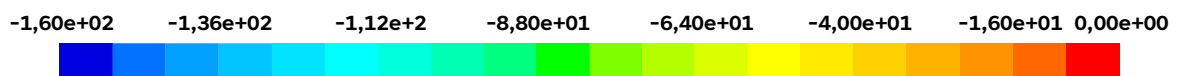
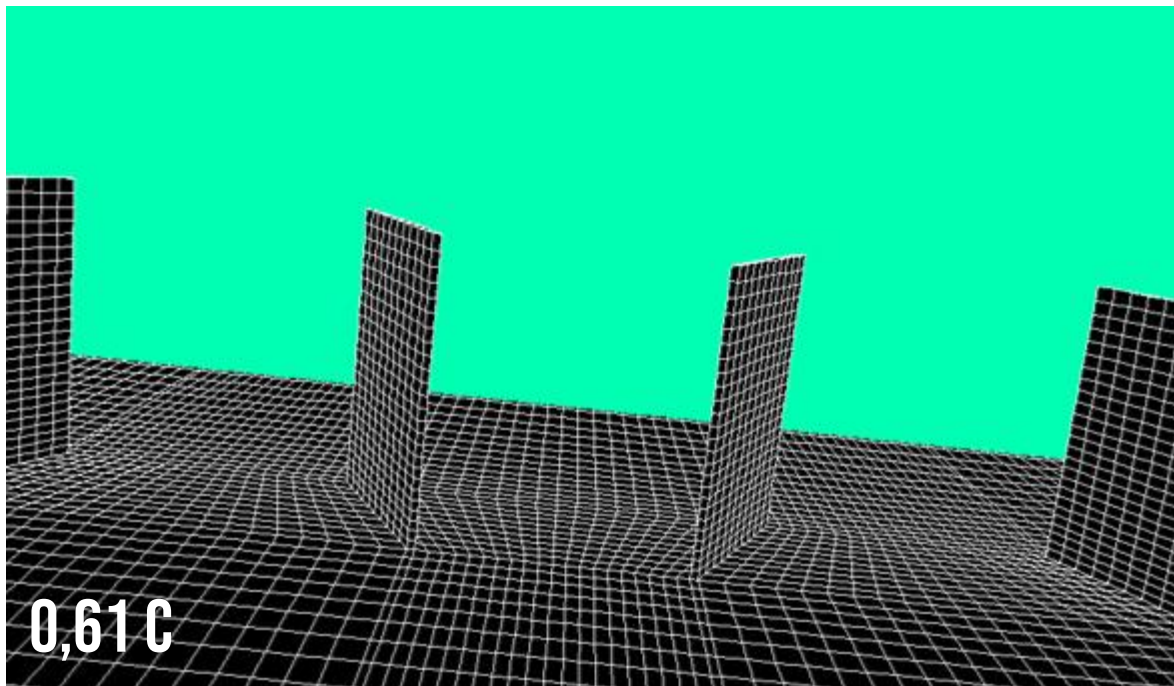
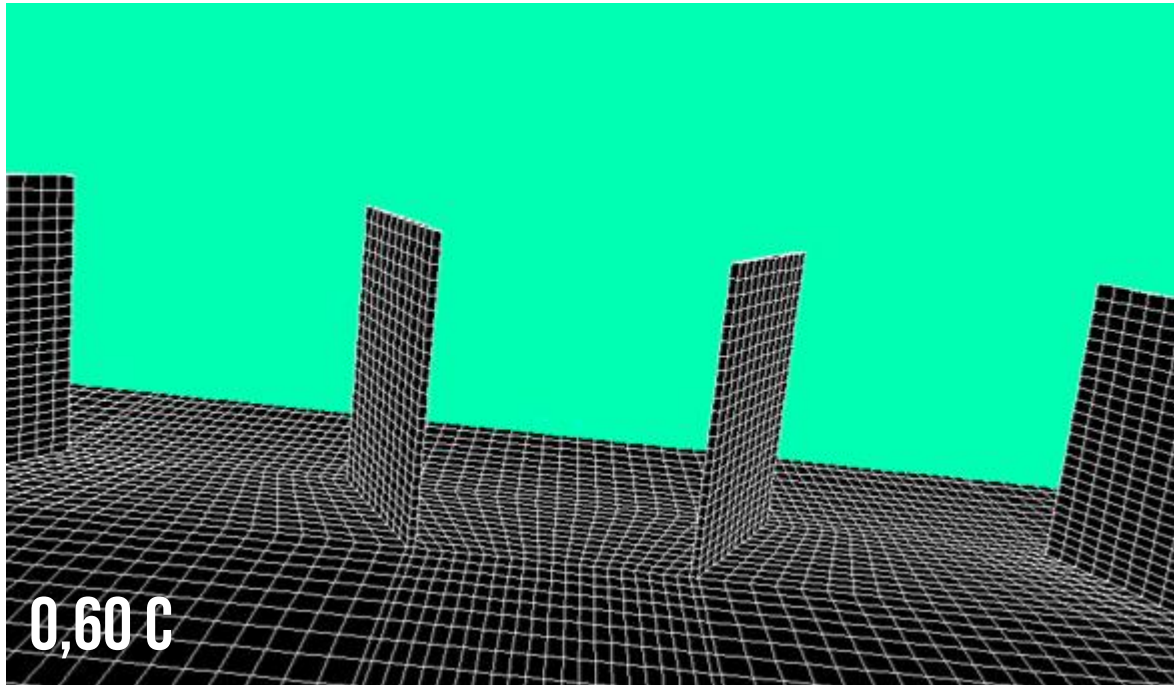
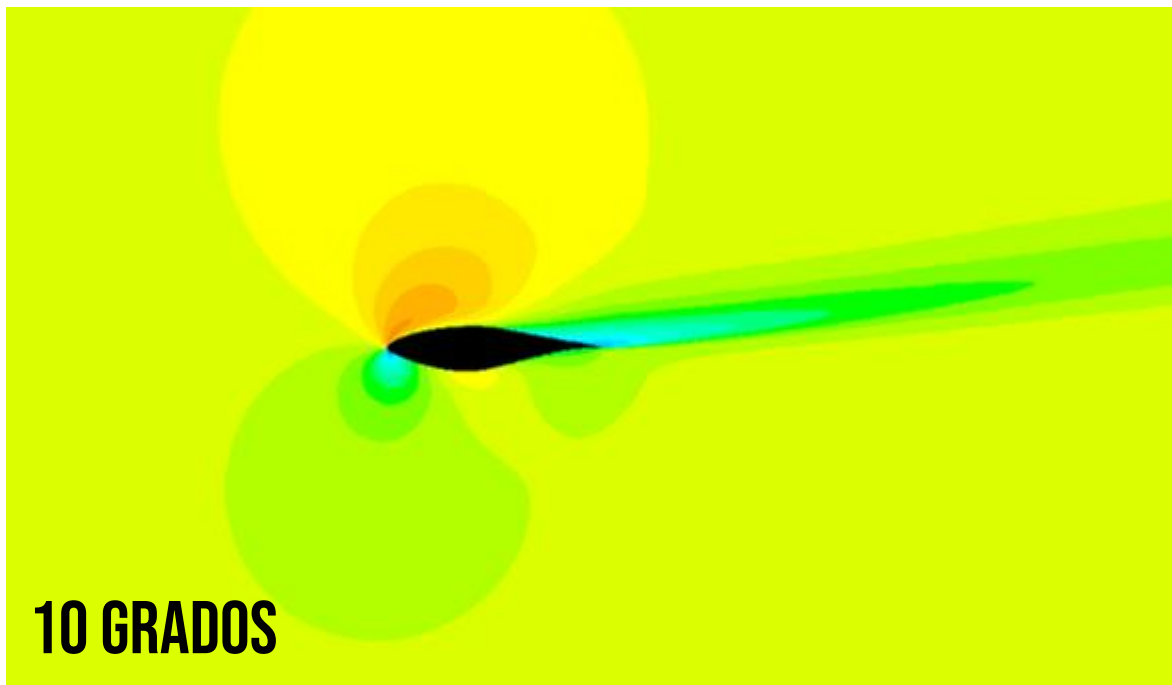
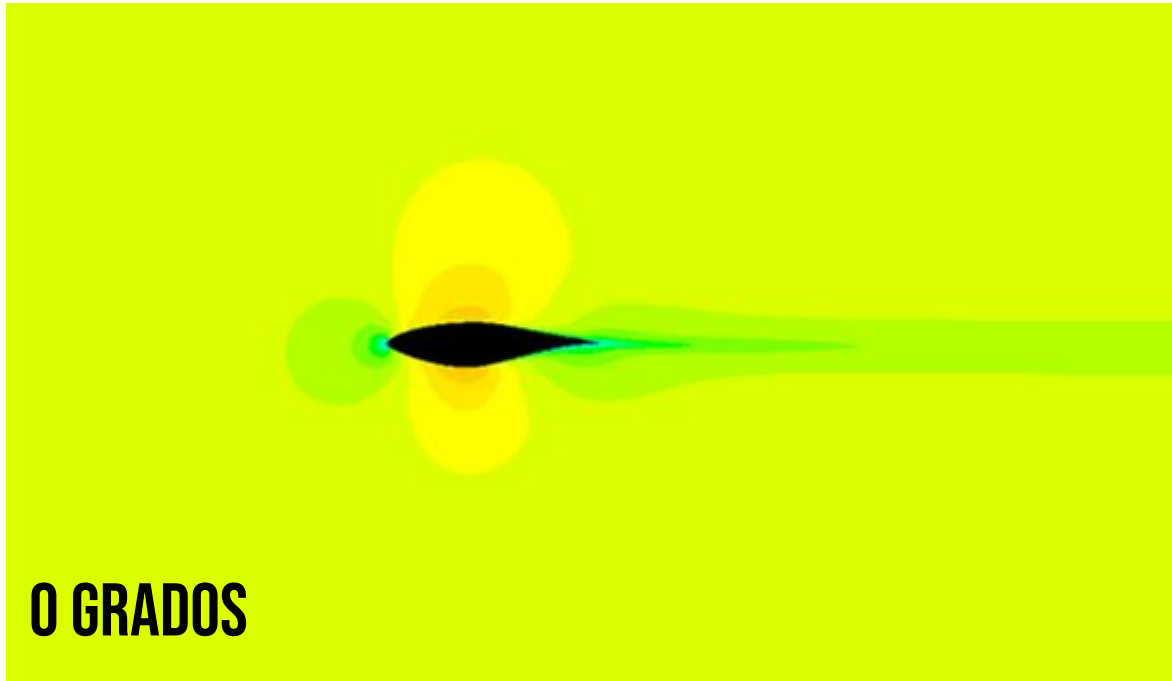
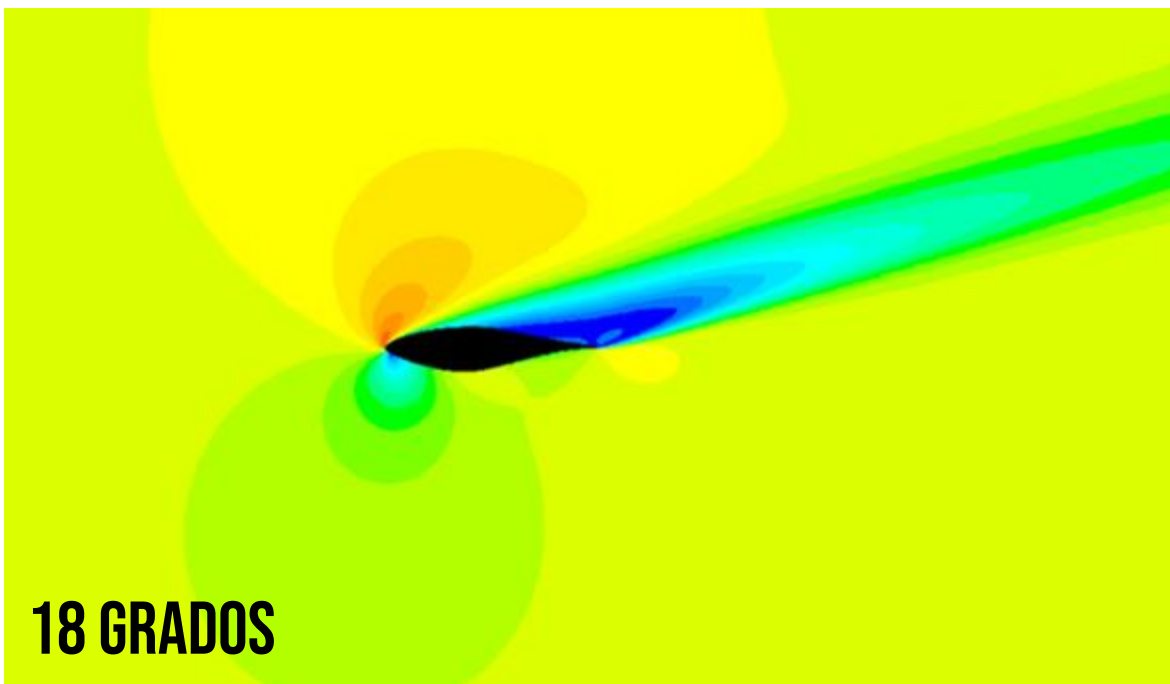
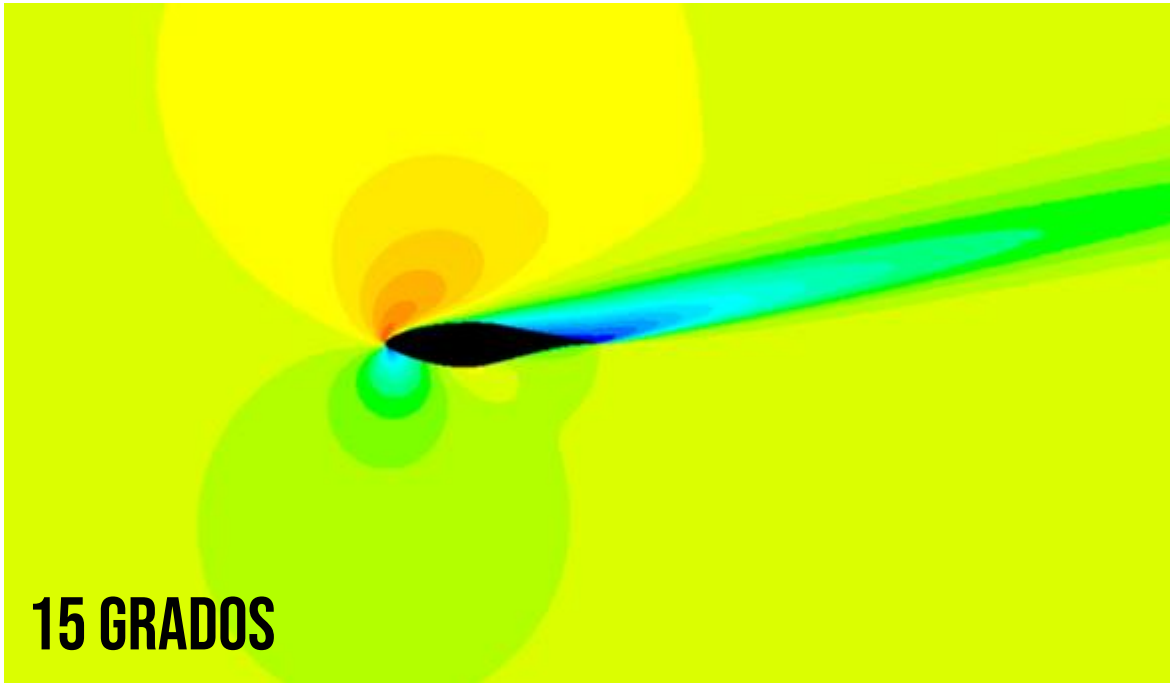


Figura 1.27. Contornos de presión detrás del VG con un ángulo de ataque de 18 grados

1.2.5. Caso 4





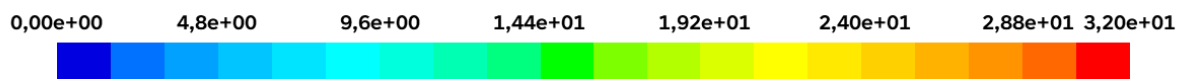
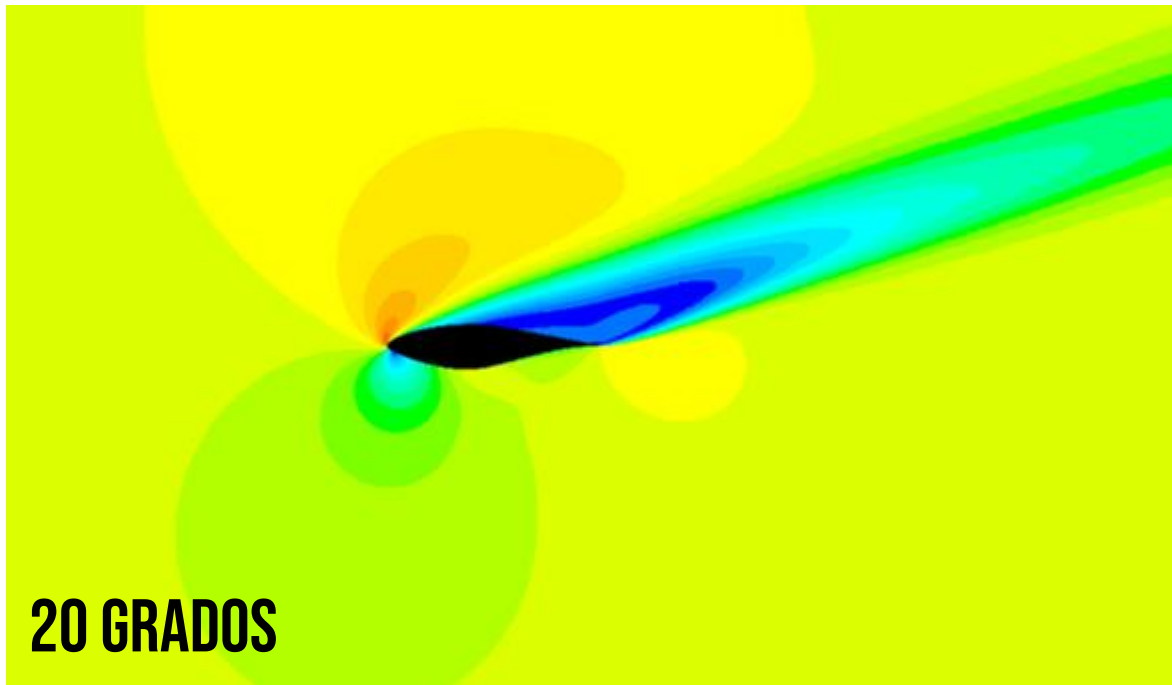
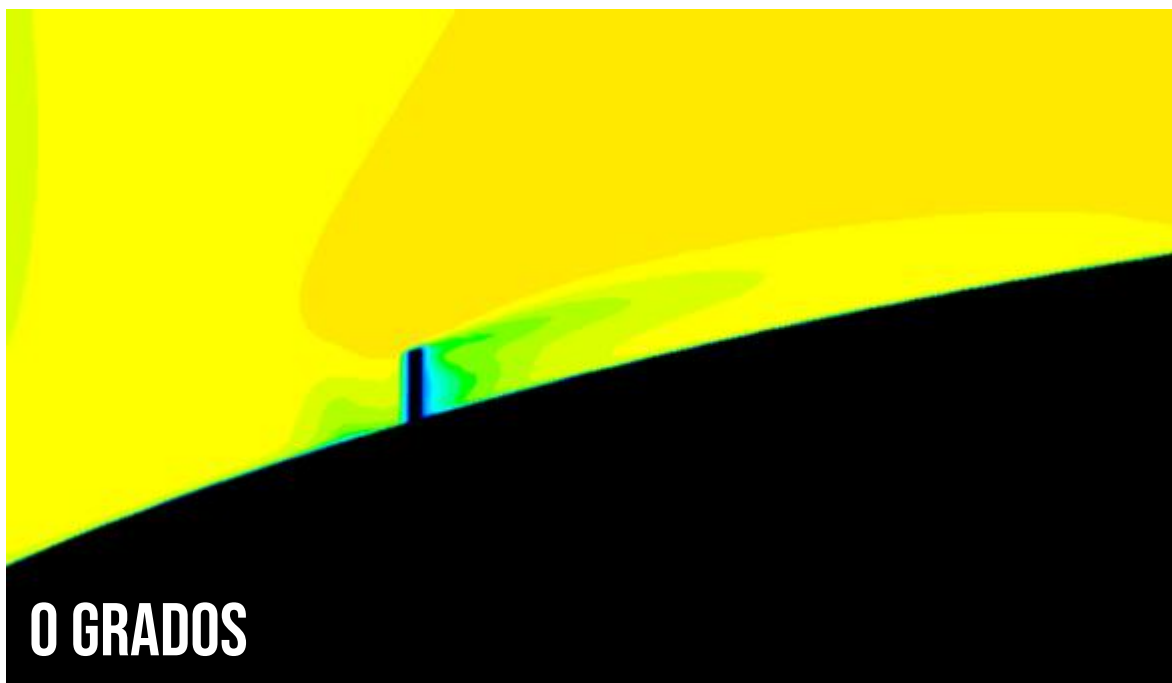
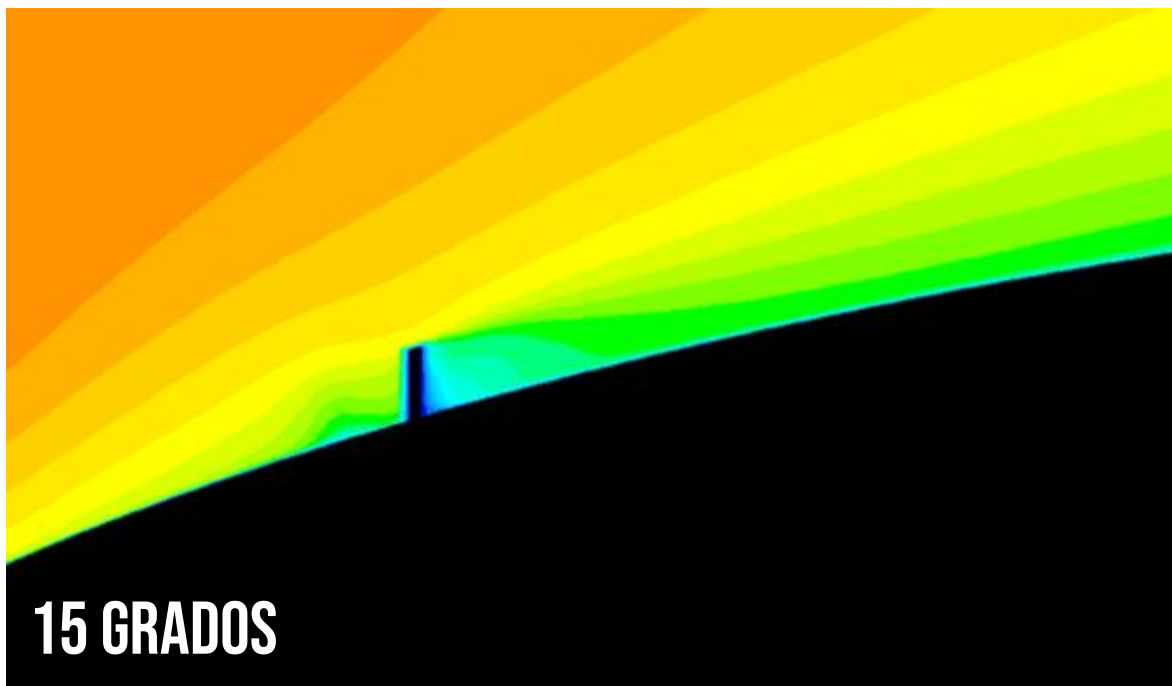
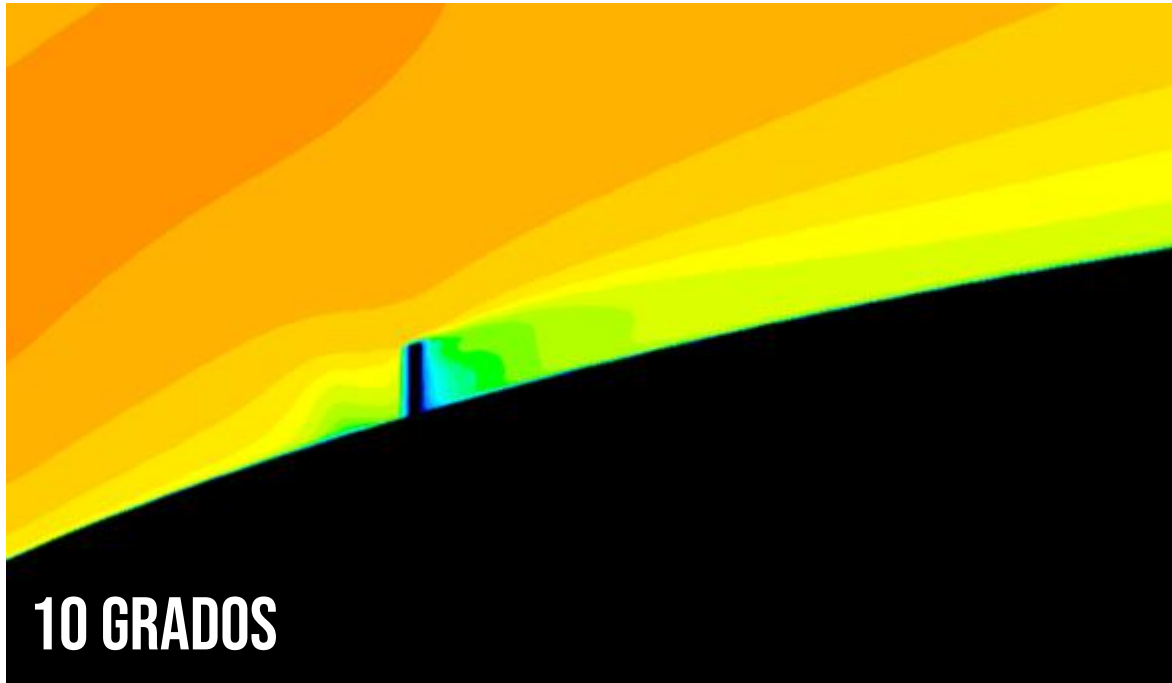


Figura 1.28. Contornos de velocidad (vista general) para diferentes ángulos de ataque





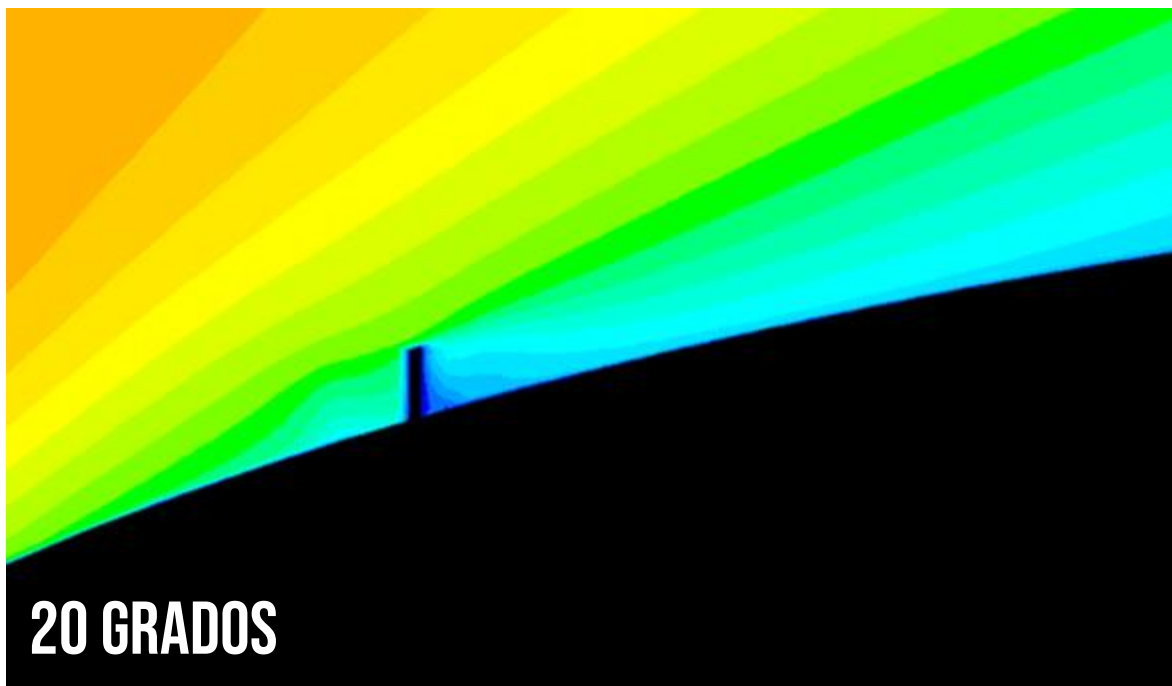
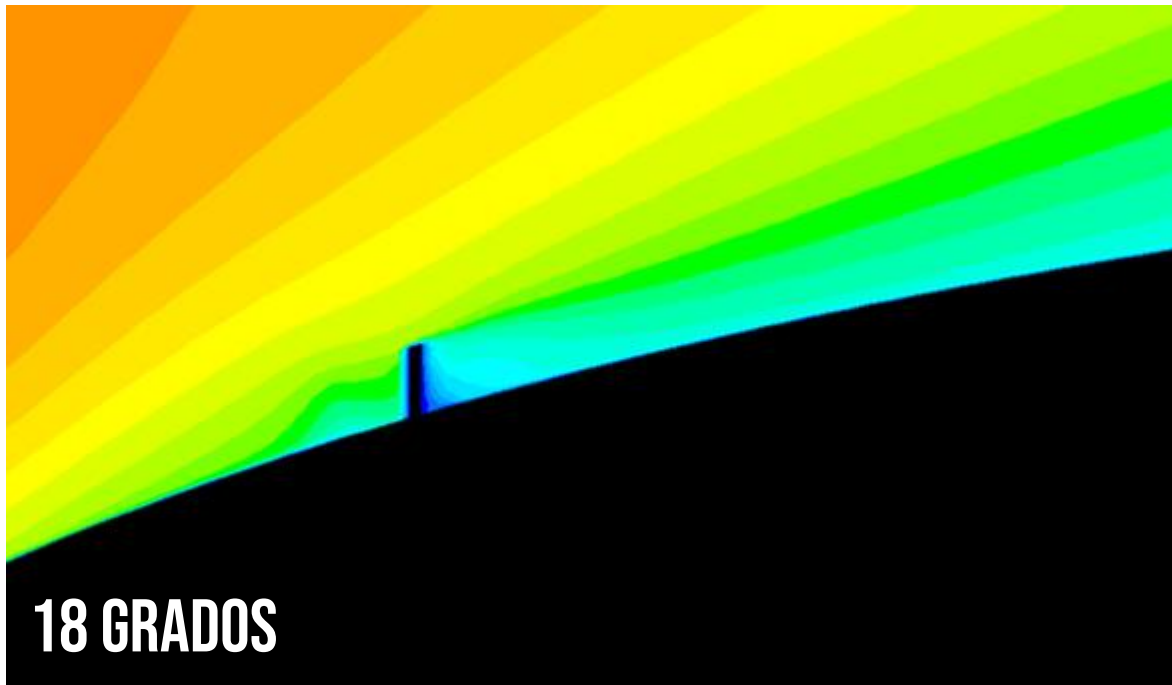
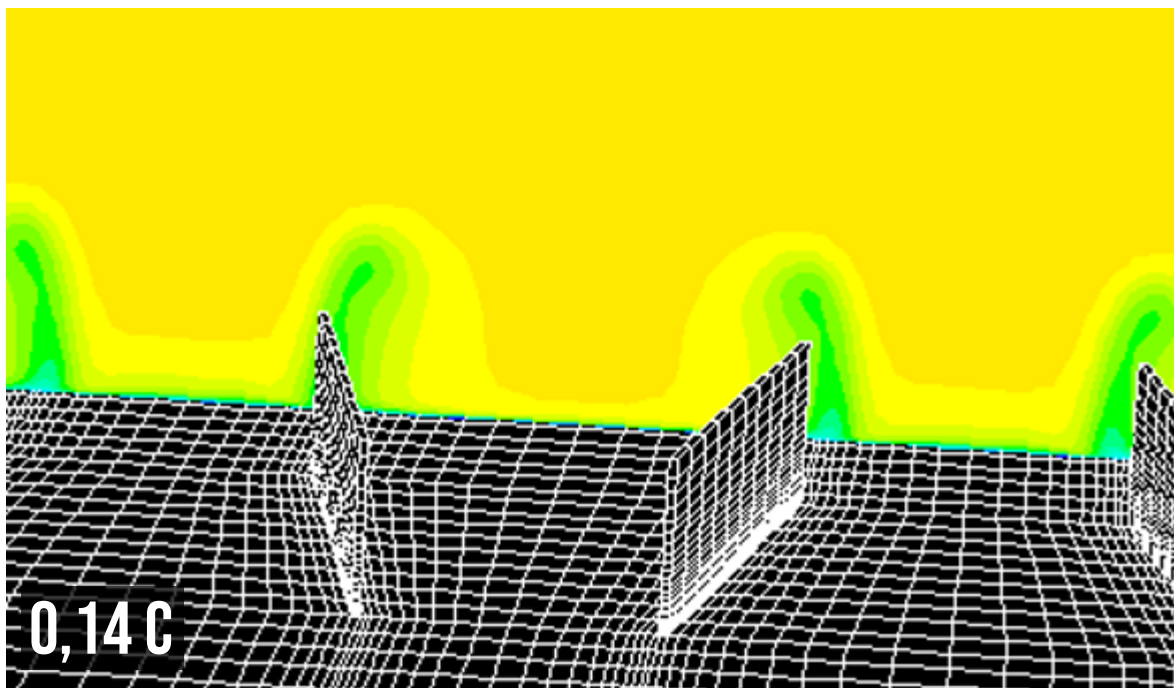
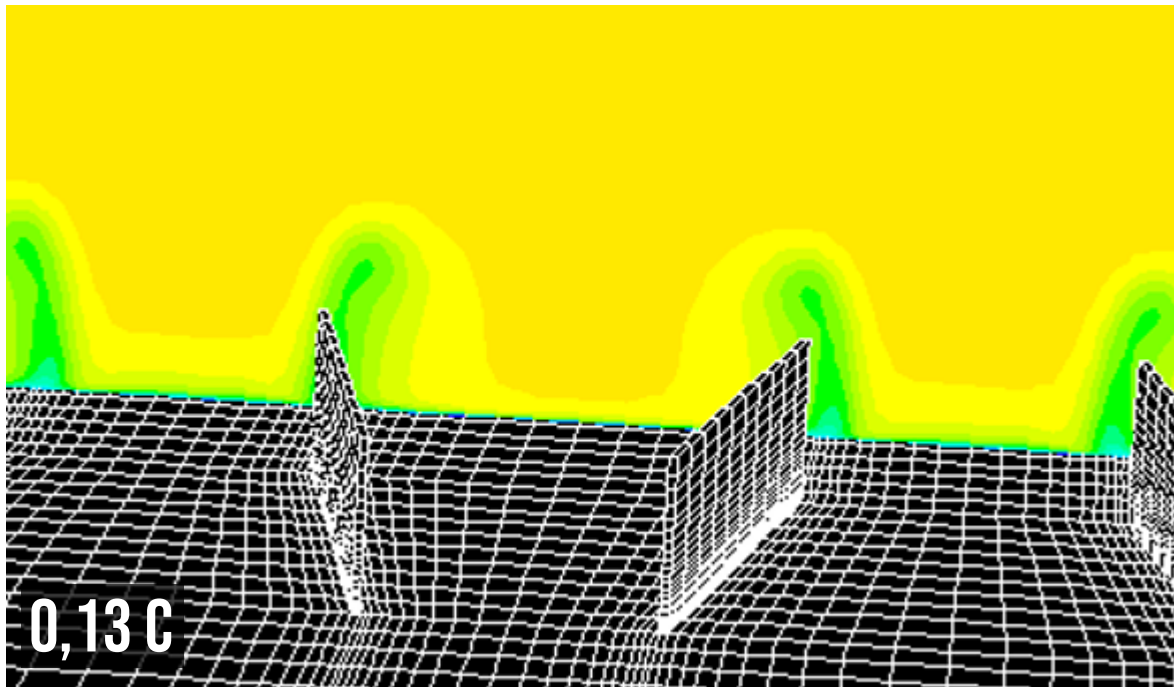
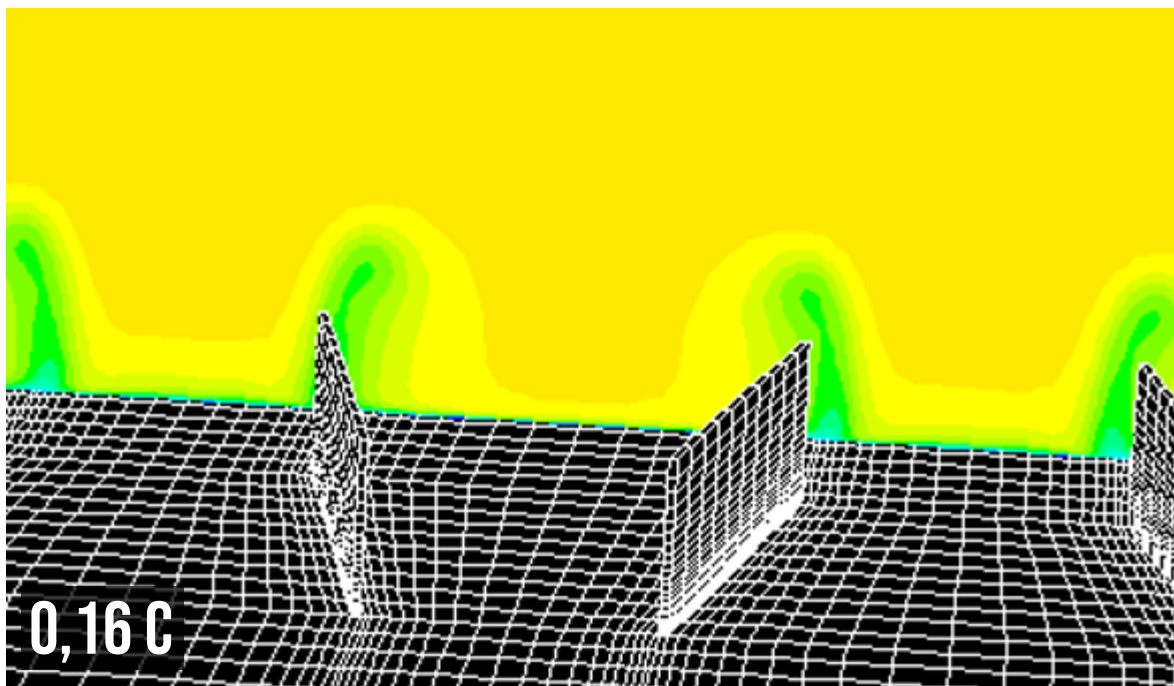
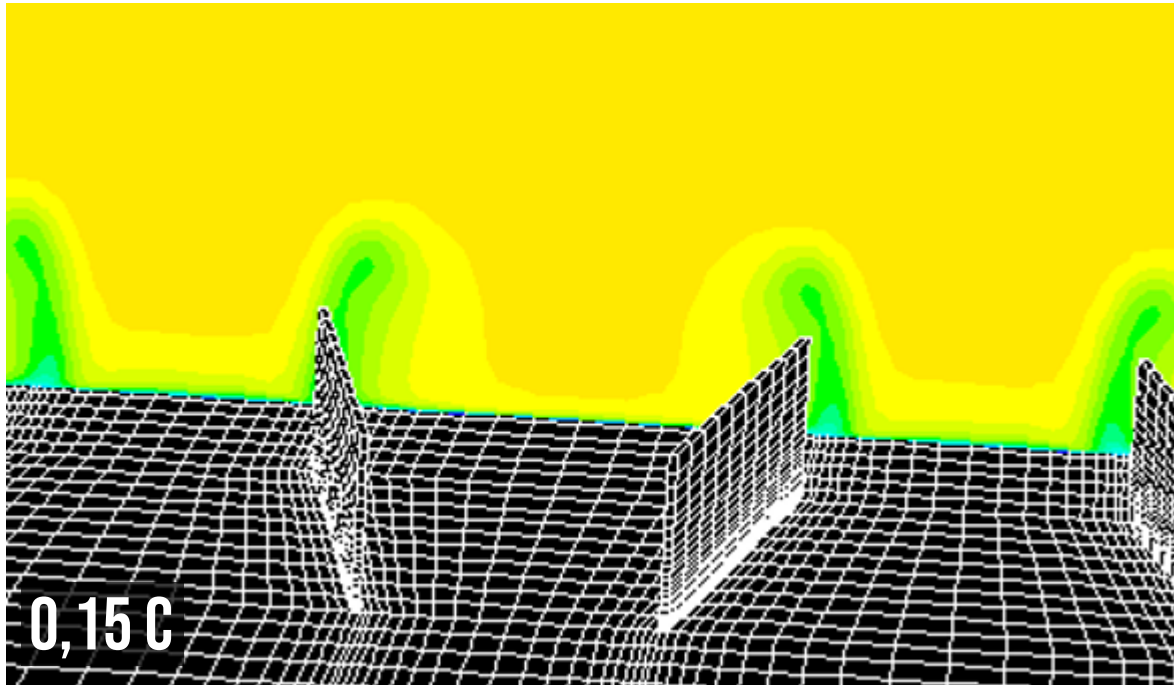


Figura 1.29. Contornos de velocidad (vista detalle) para diferentes ángulos de ataque





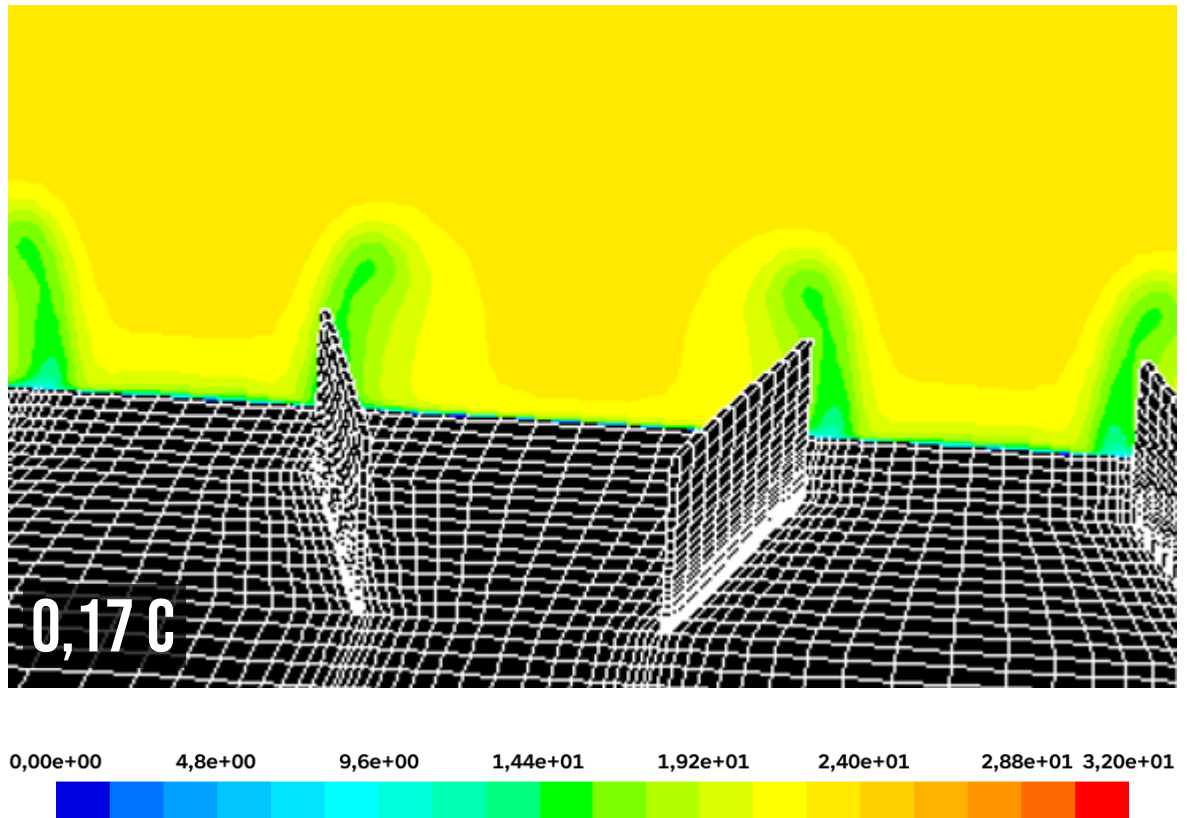
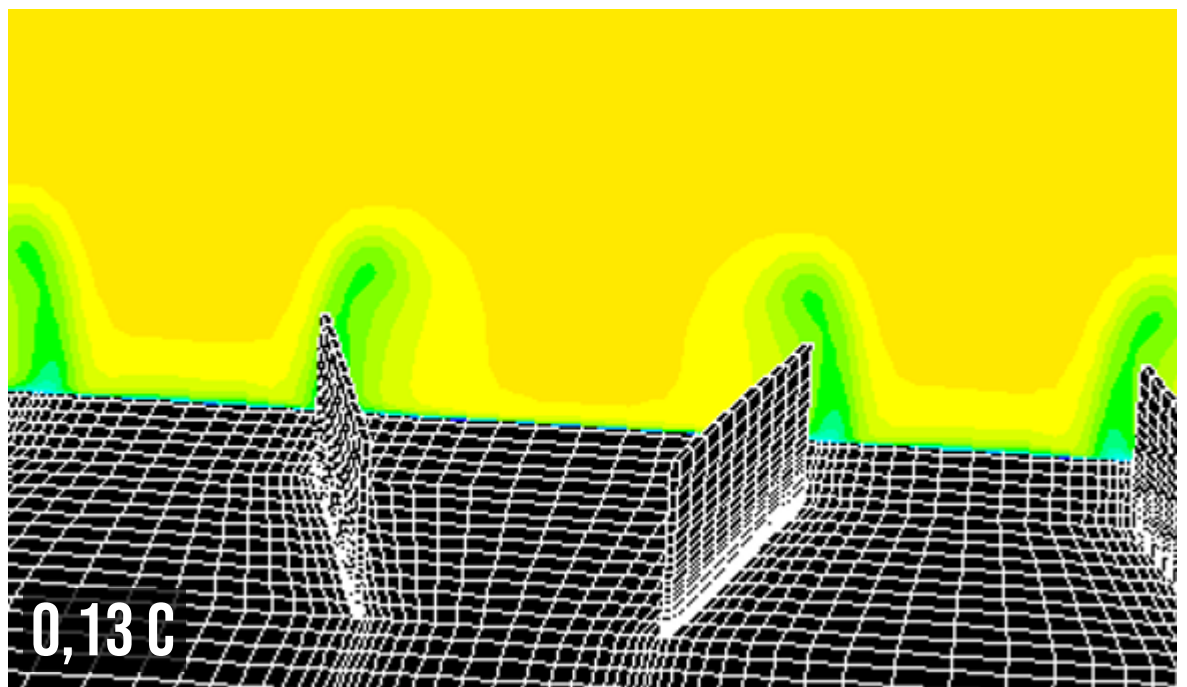
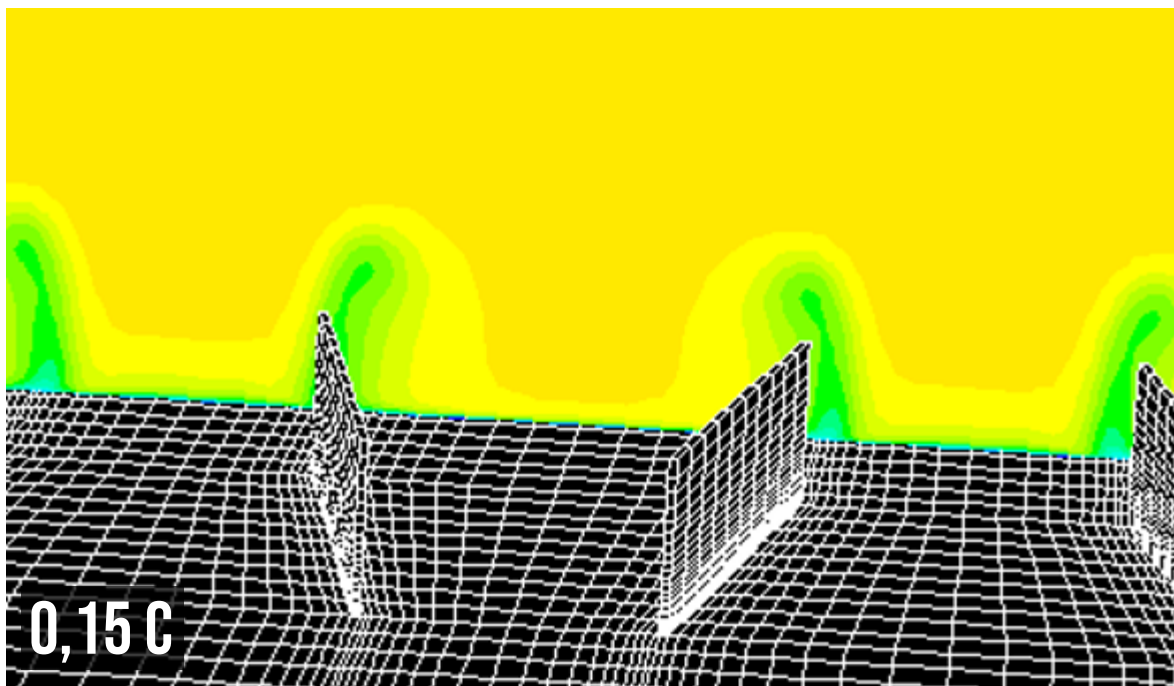
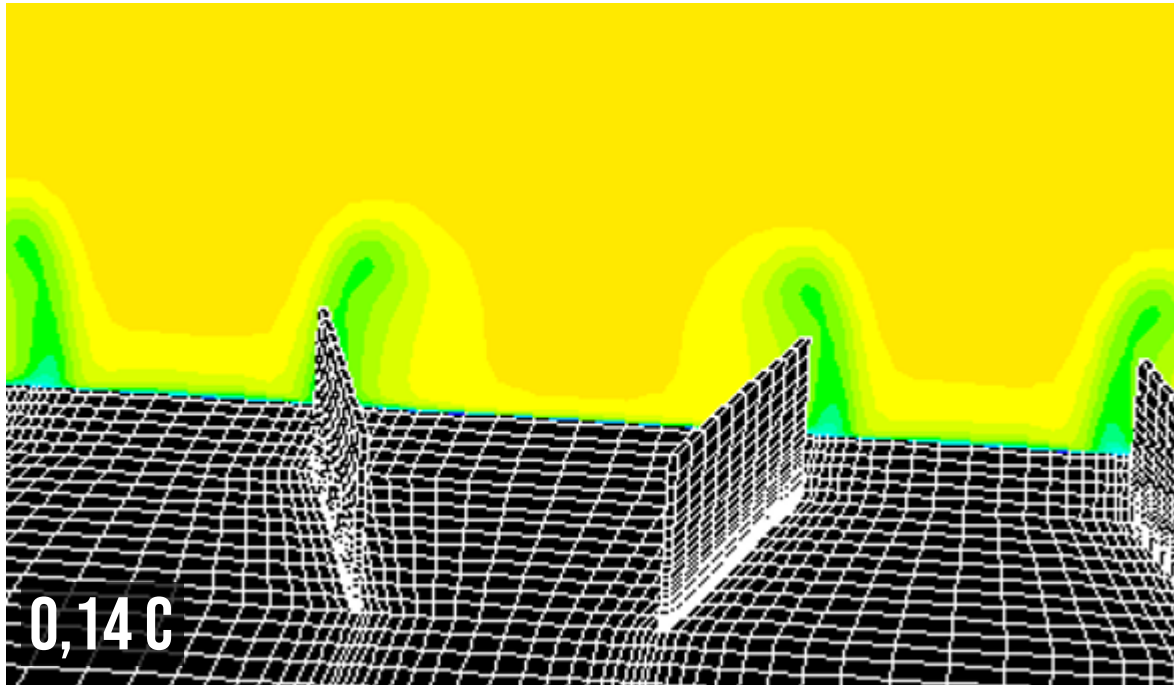


Figura 1.30. Contornos de velocidad detrás del VG con un ángulo de ataque de 0 grados





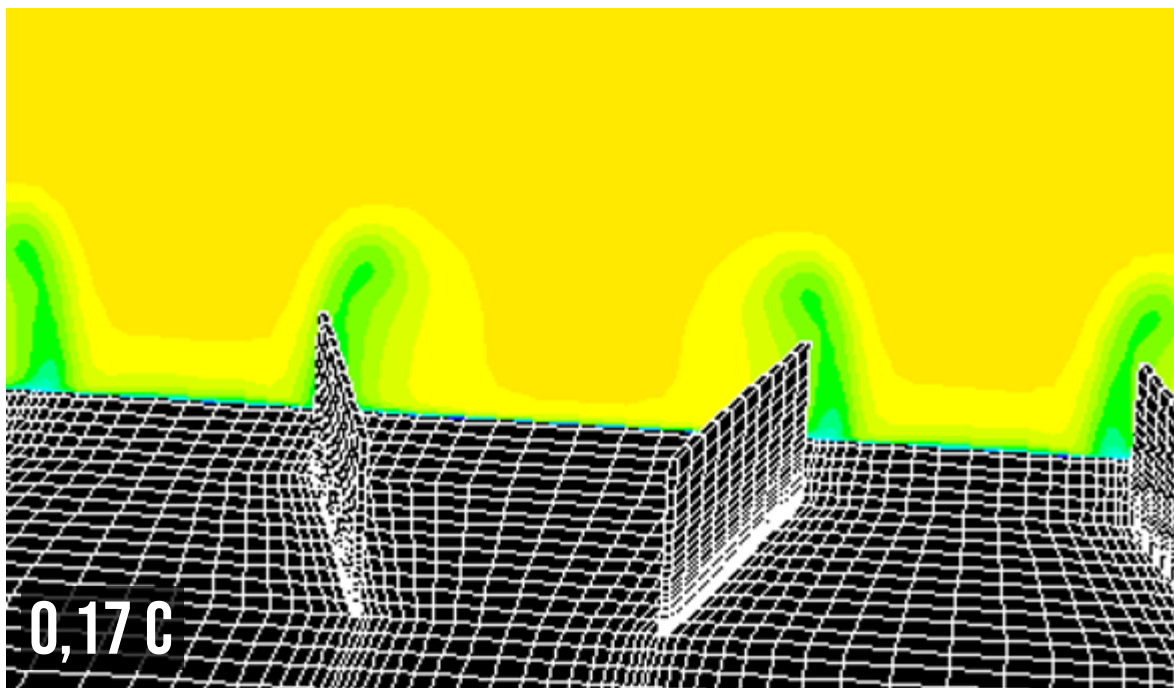
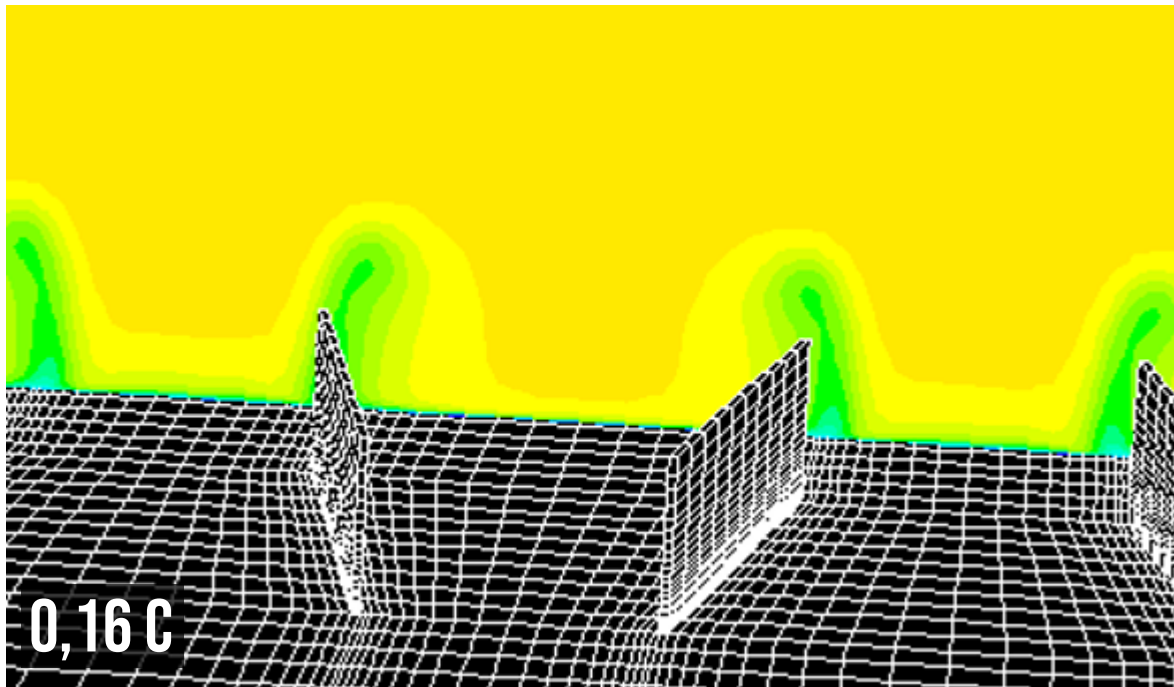
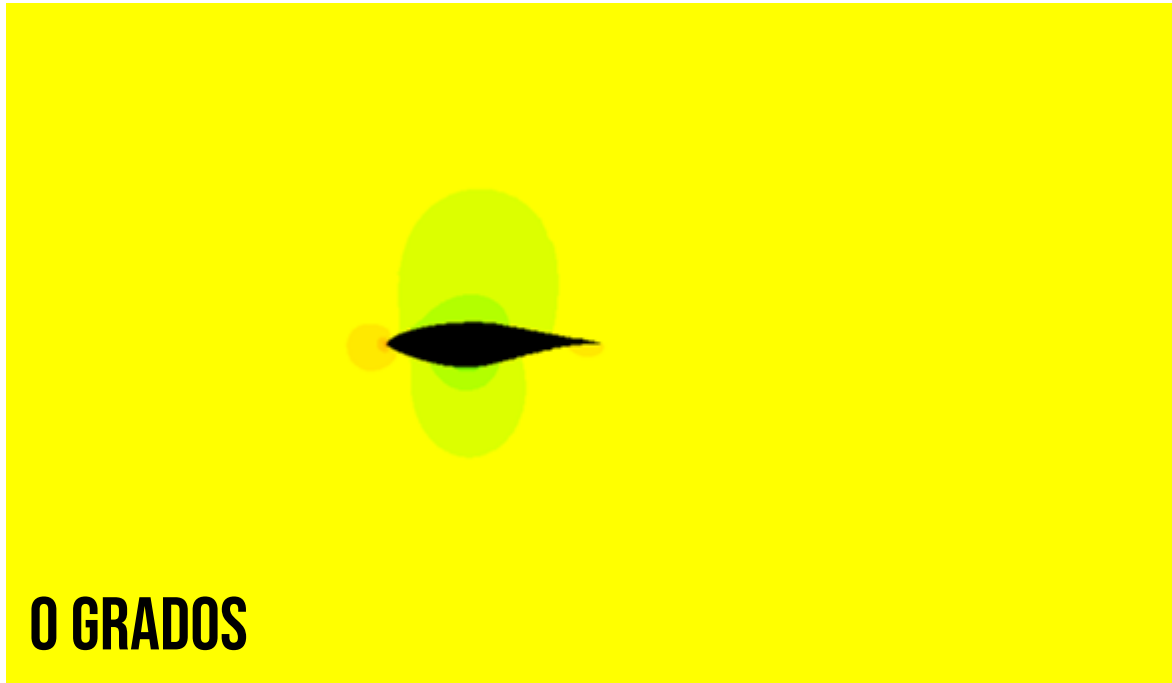
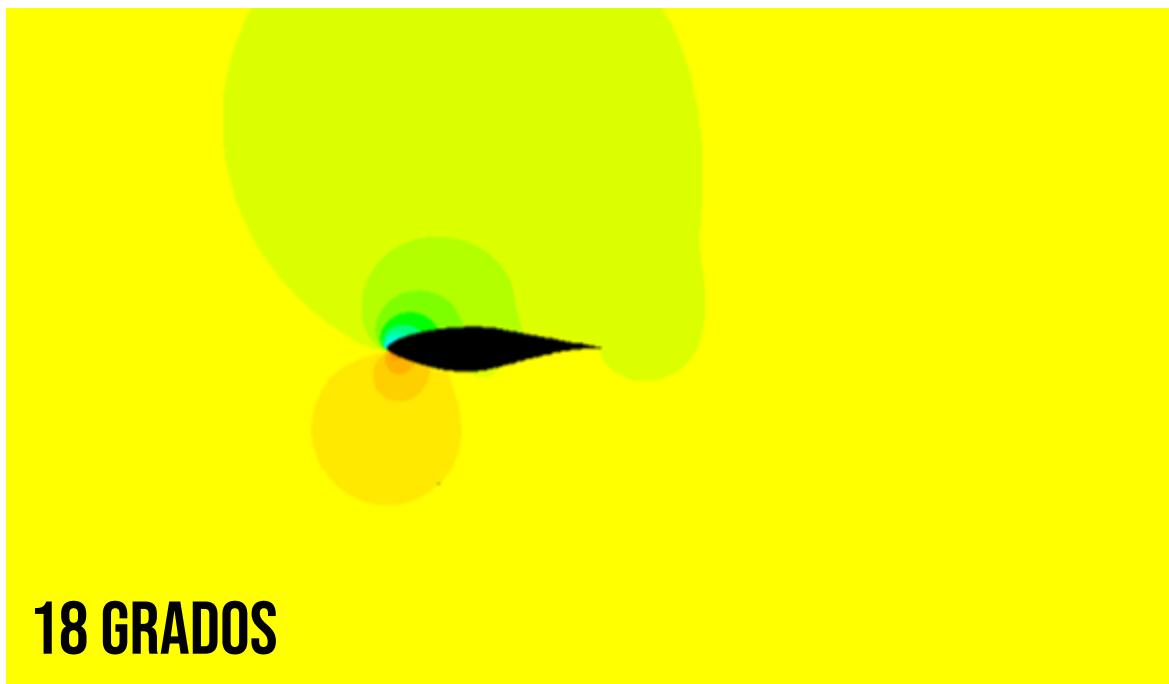
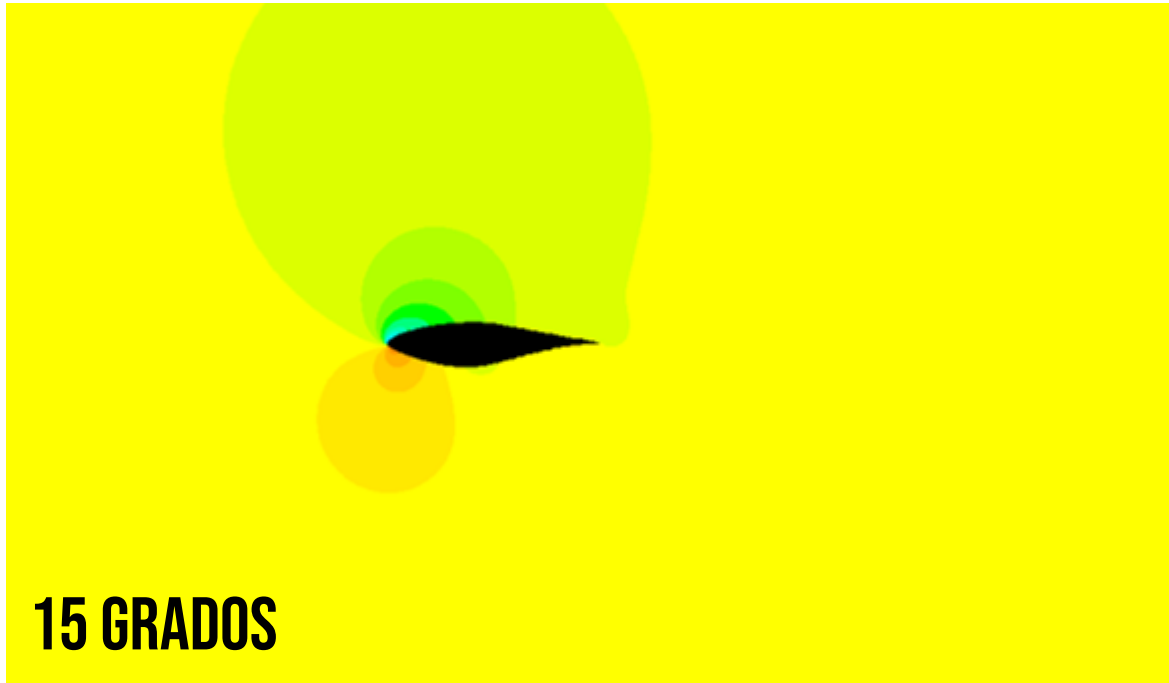


Figura 1.31. Contornos de velocidad detrás del VG con un ángulo de ataque de 18 grados





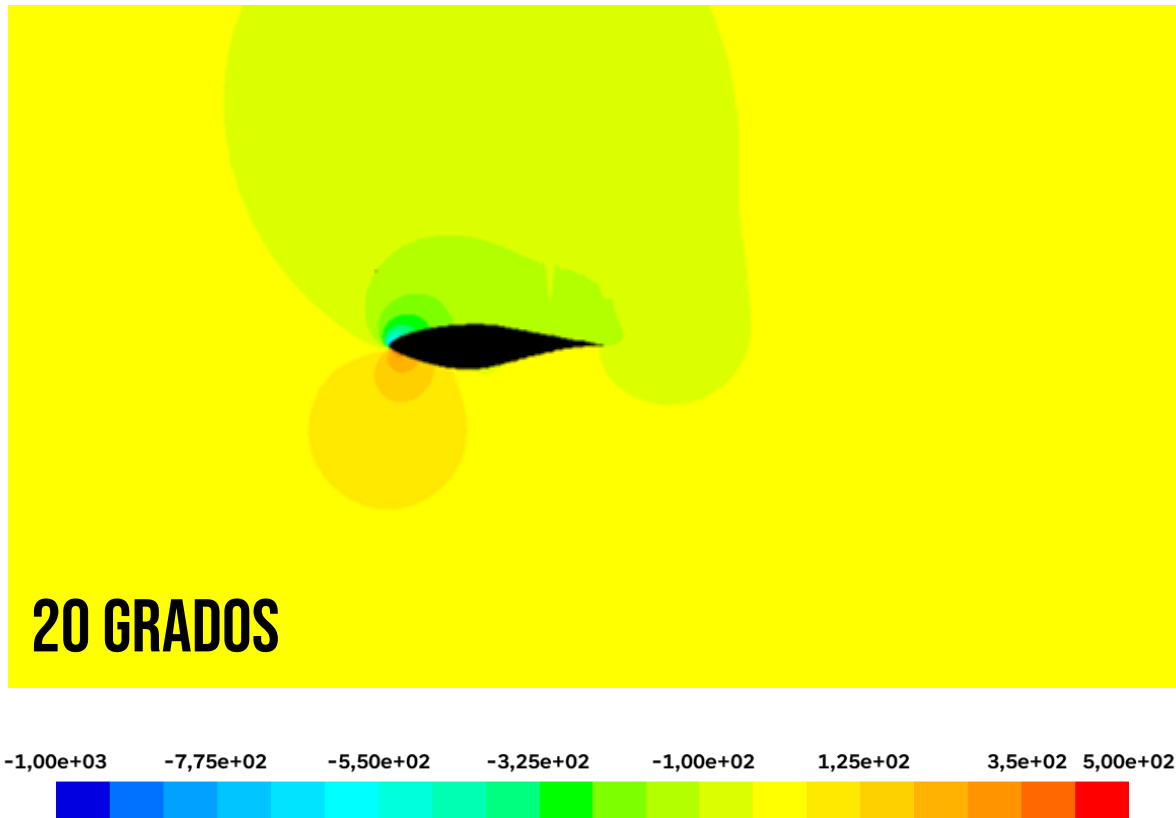
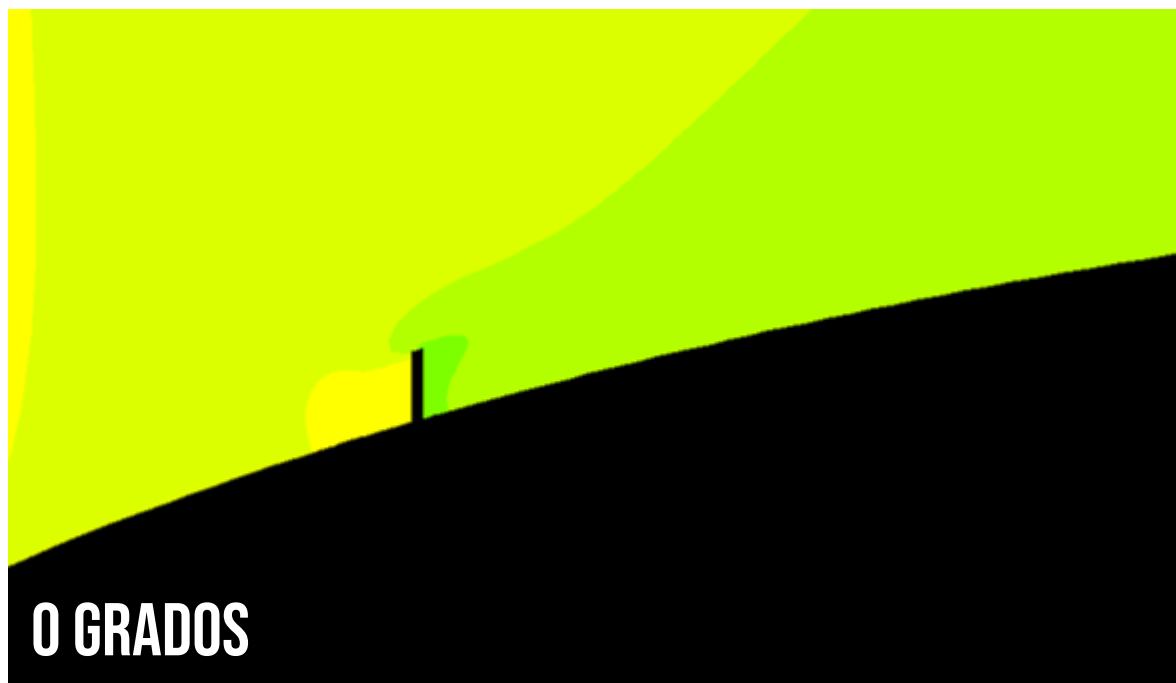
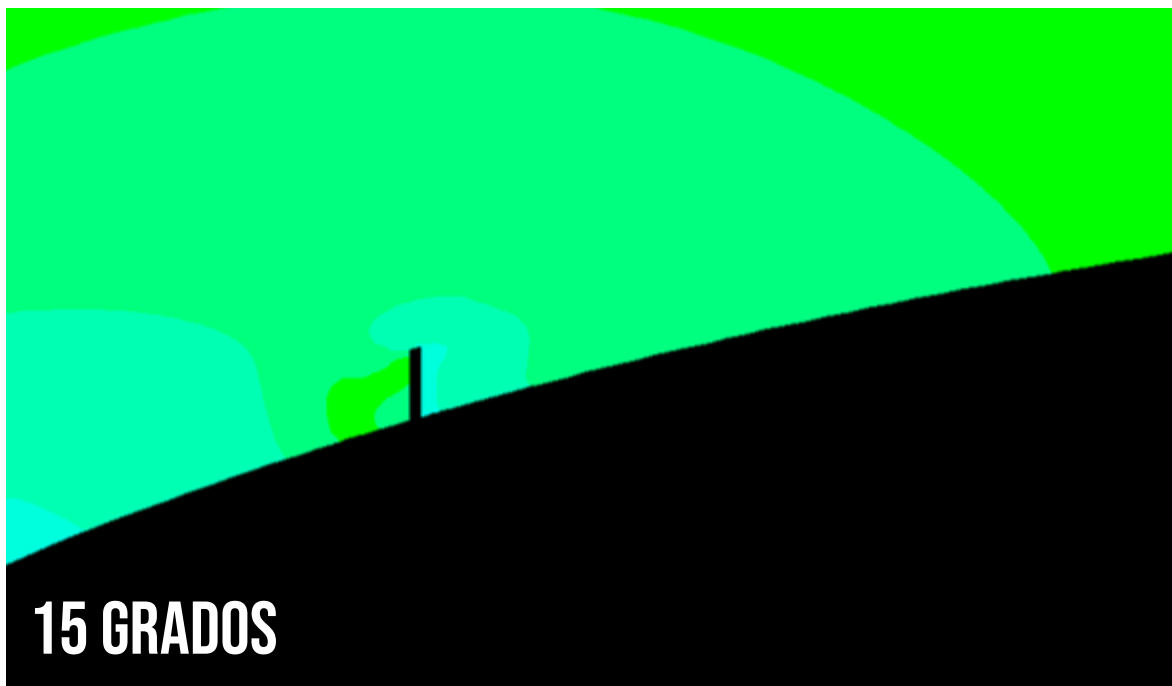
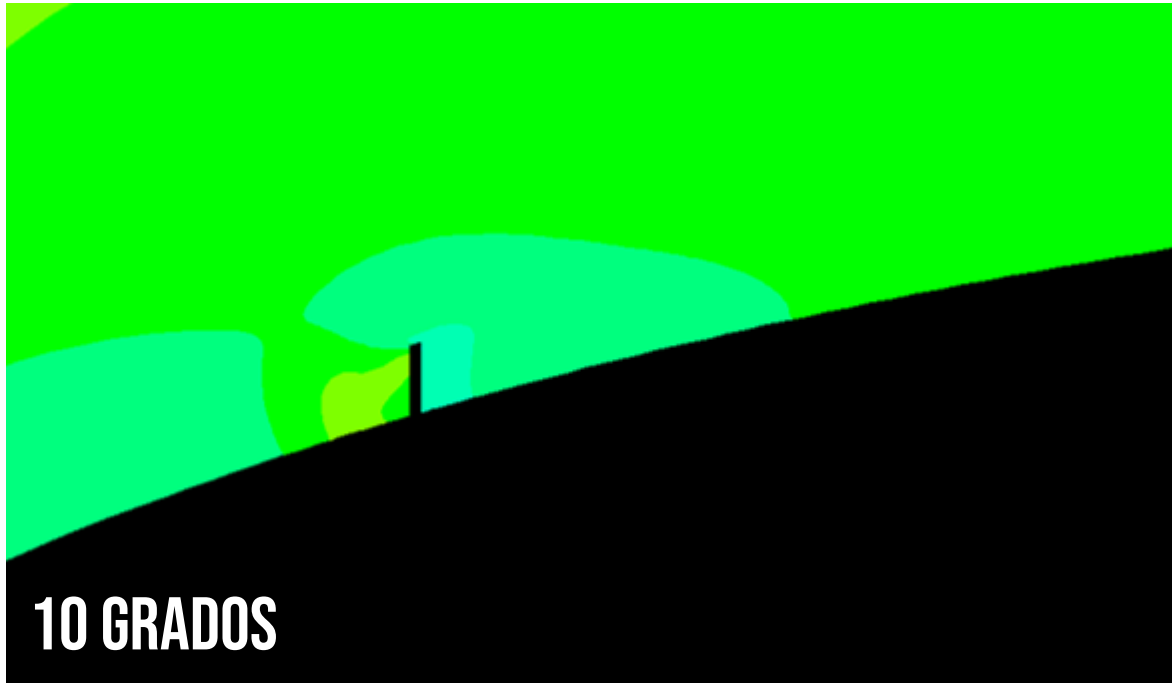


Figura 1.32- Contornos de presión (vista general) a diferentes ángulos de ataque





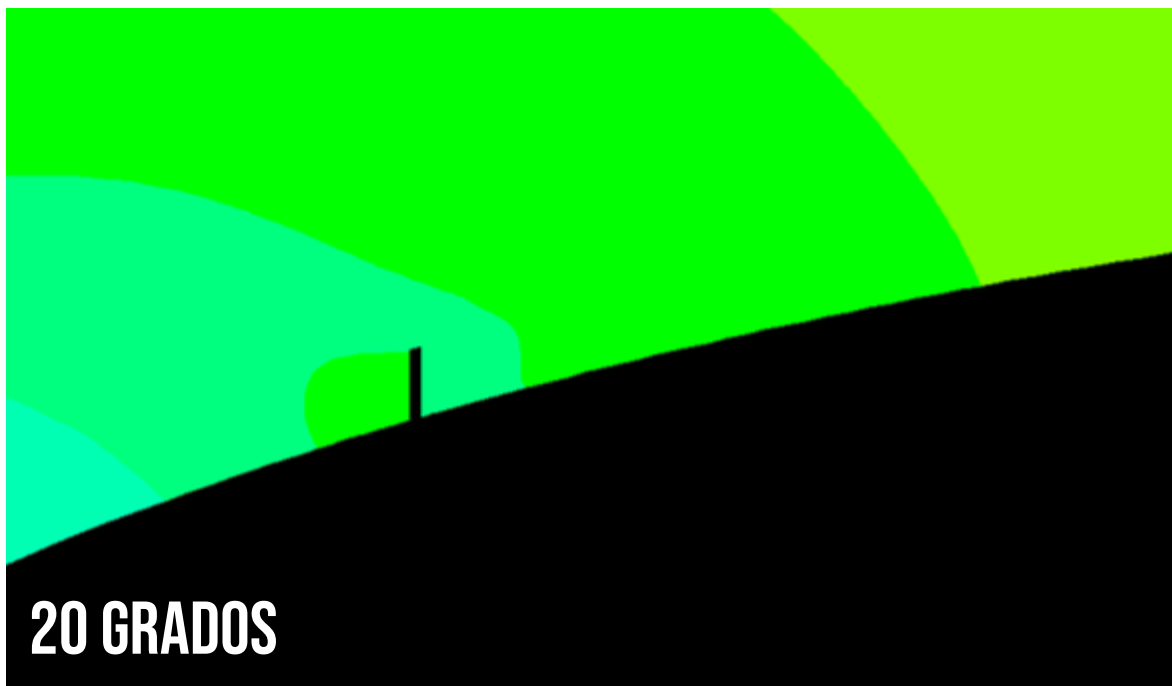
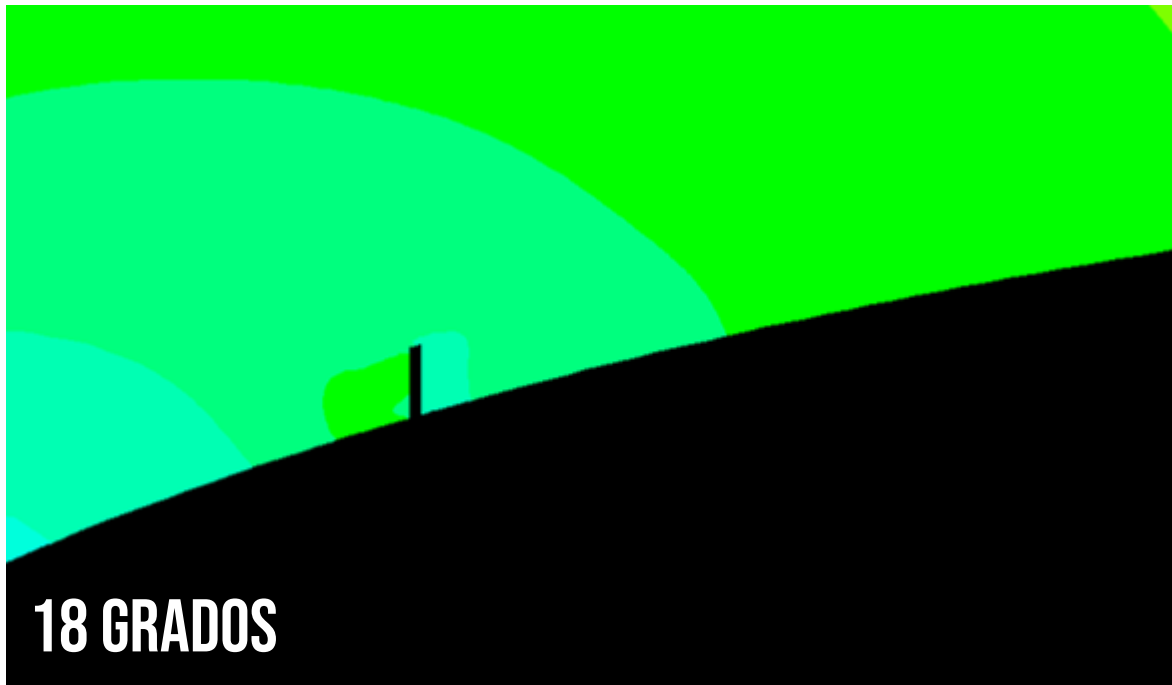
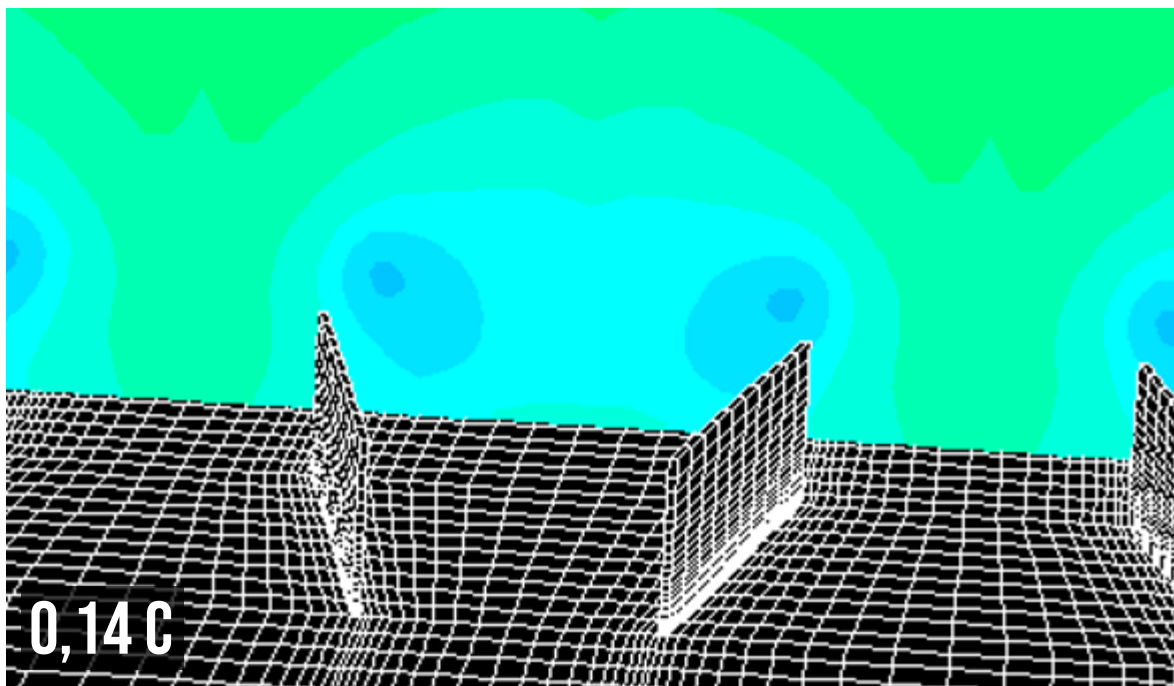
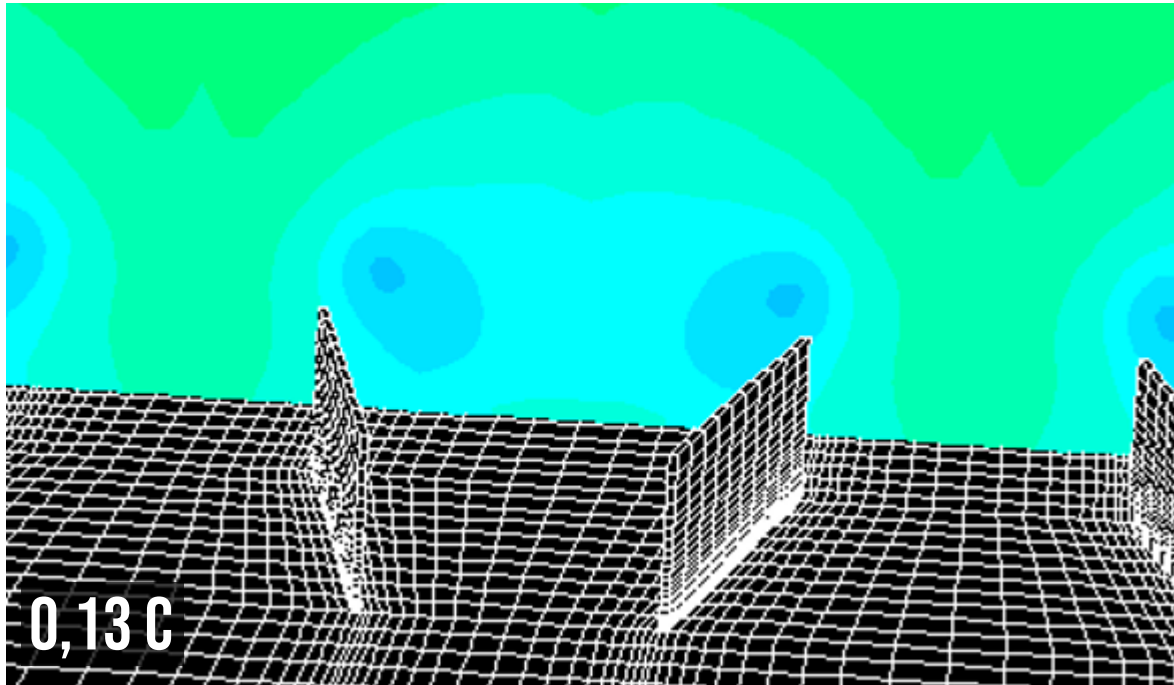
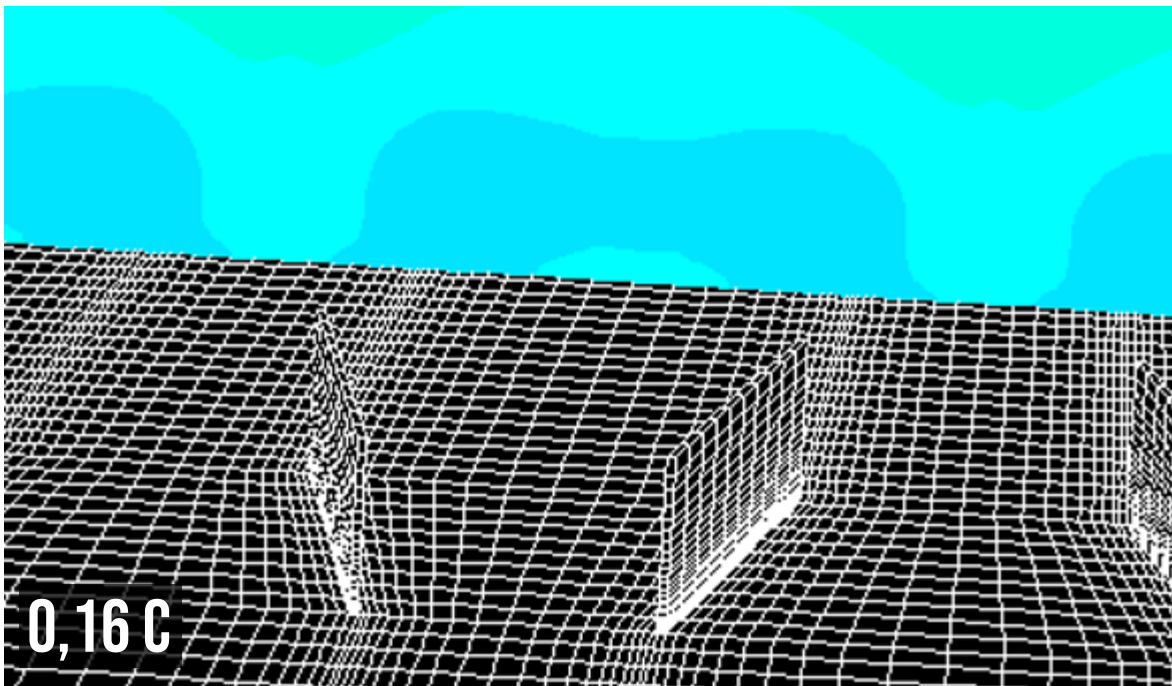
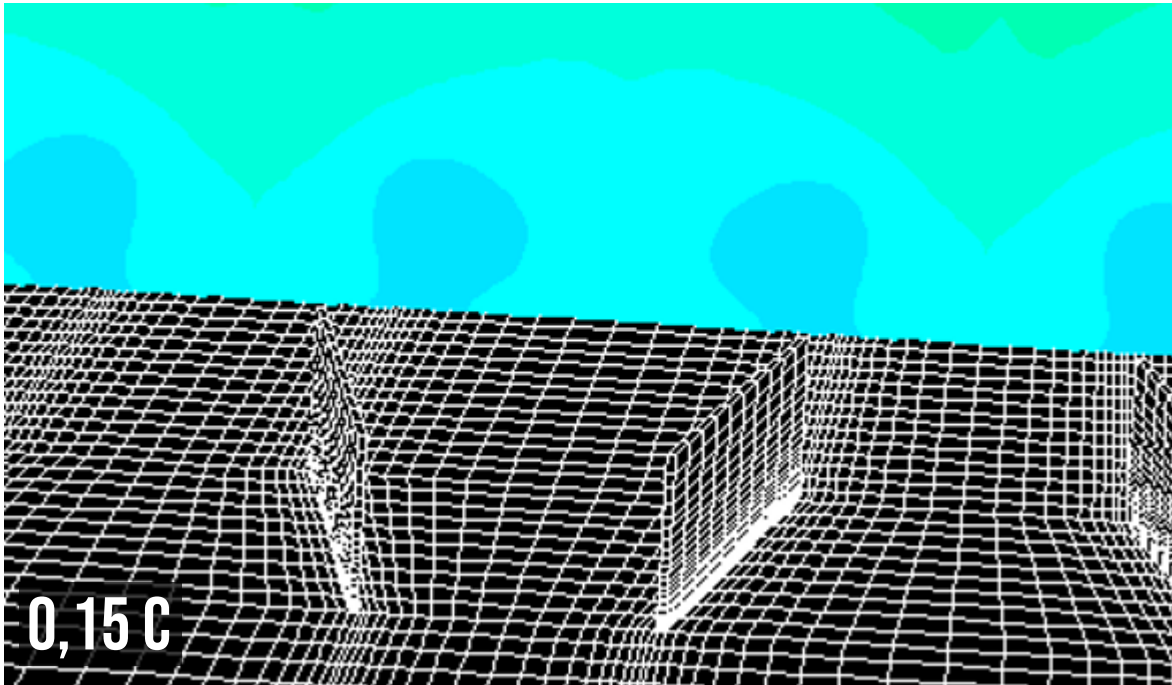


Figura 1.33. Contornos de presión (vista detalle) a distintos ángulos de ataque





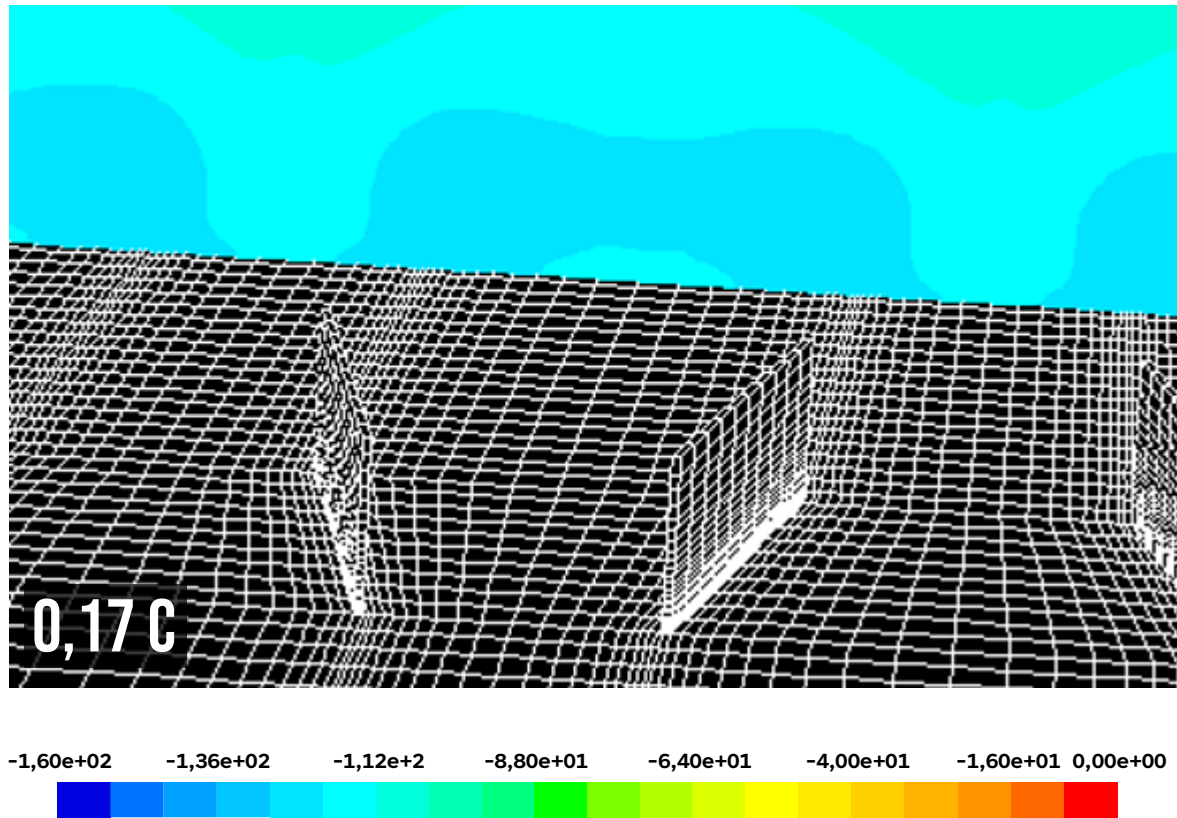
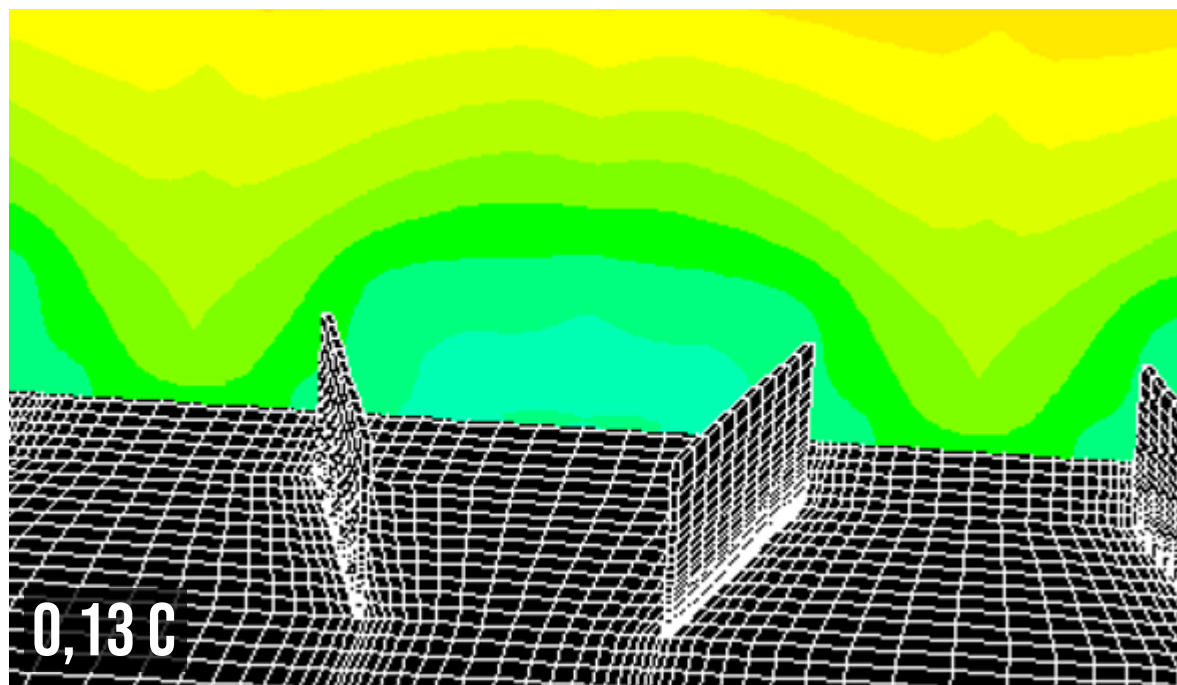
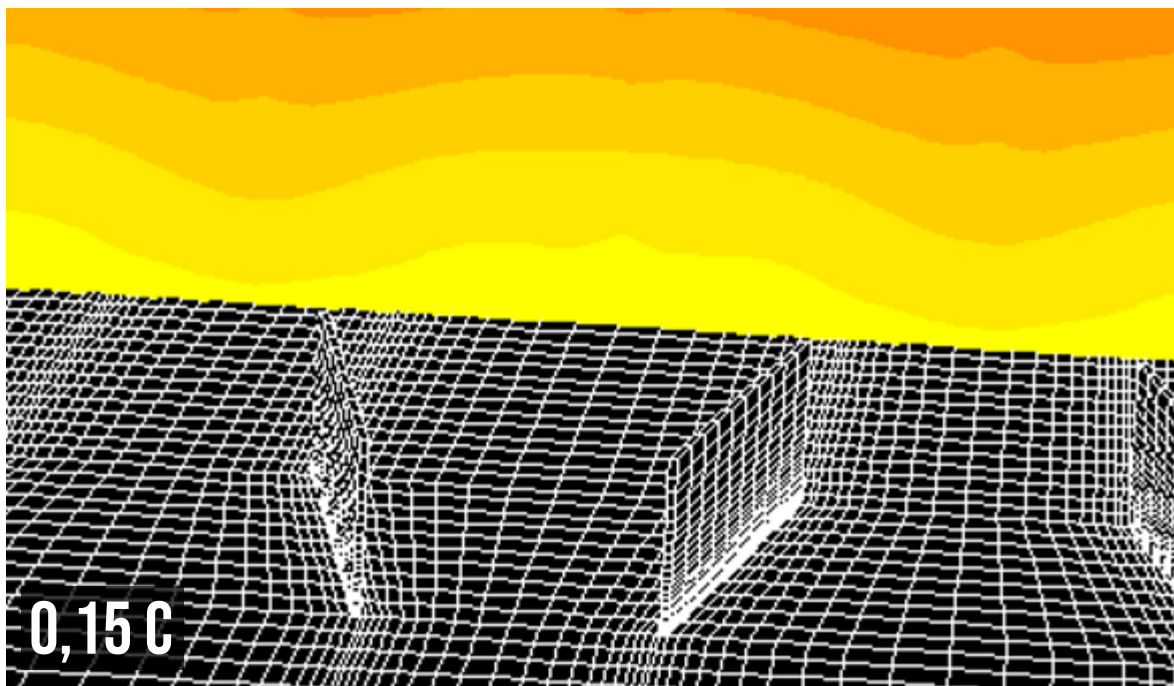
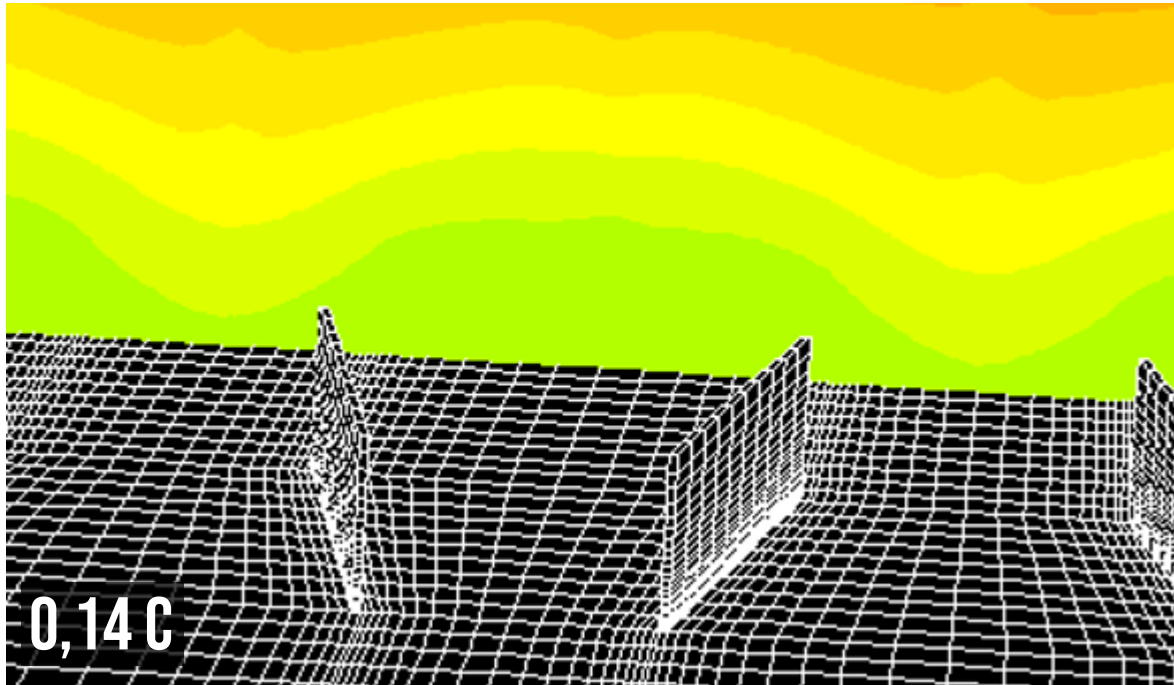


Figura 1.34. Contornos de presión detrás del VG con un ángulo de ataque de 0 grados





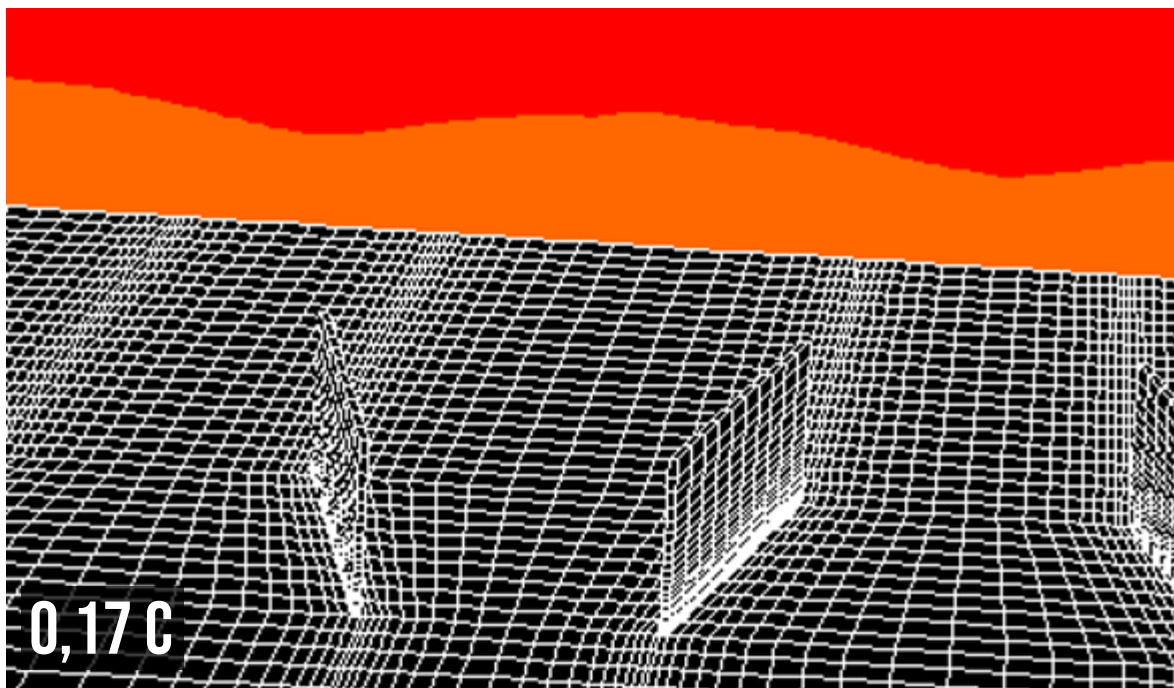
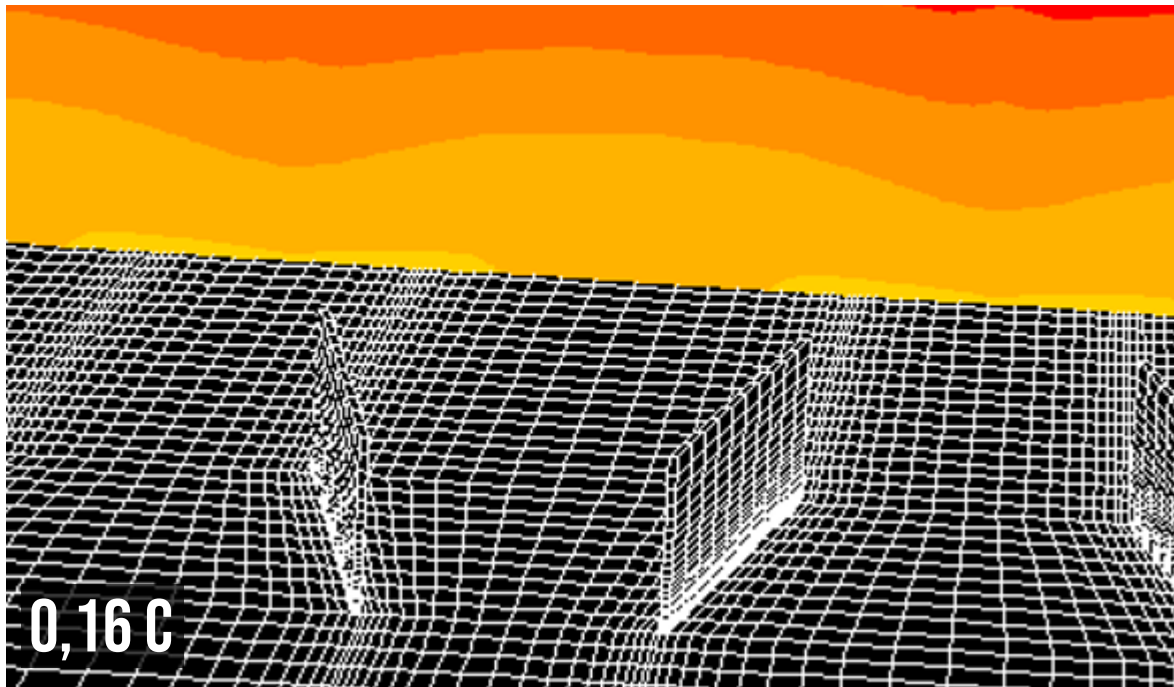


Figura 1.35. Contornos de presión detrás del VG con un ángulo de ataque de 18 grados

