Appendix 3.3 – EXPERIMENTAL RESULTS FROM TU MUNICH

by

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In this chapter further results are added for angles of attack which are not discussed in detail in this report but were tested within the TU Munich investigations for the Vortex Flow Experiment 2 (VFE-2) project. These results include:

- Oil flow visualisation using black pigment at α = 13°, 18° and 23° for $R_{mac} = 1 \times 10^6$, M = 0.07 are shown in Figure A3.3-1 and at α = 10°, 12°, 13°, 14°, 16°, 18°, 20°, 21°, 22°, 23°, 24°, 25°, 26°, 27°, 28°, 29° and 30° for $R_{mac} = 2 \times 10^6$, M = 0.14 in Figure A3.3-2 to Figure A3.3-7.
- Steady pressure distributions are presented at α = 0°, 5°, 10°, 12°, 13°, 14°, 16°, 18°, 20°, 21°, 22°, 23°, 24°, 25°, 26°, 27°, 28°, 29° and 30° for $R_{mac} = 1 \times 10^6$, M = 0.07 in Figure A3.3-8 to Figure A3.3-13 and for $R_{mac} = 2 \times 10^6$, M = 0.14 in Figure A3.3-14 to Figure A3.3-19.
- Pressure fluctuation intensities are shown at α = 0°, 5°, 10°, 12°, 13°, 14°, 16°, 18°, 20°, 21°, 22°, 23°, 24°, 25°, 26°, 27°, 28°, 29° and 30° for $R_{mac} = 1 \times 10^6$, M = 0.07 in Figure A3.3-20 to Figure A3.3-25 and for $R_{mac} = 2 \times 10^6$, M = 0.14 Figure A3.3-26 to Figure A3.3-31, see Chapter 21.

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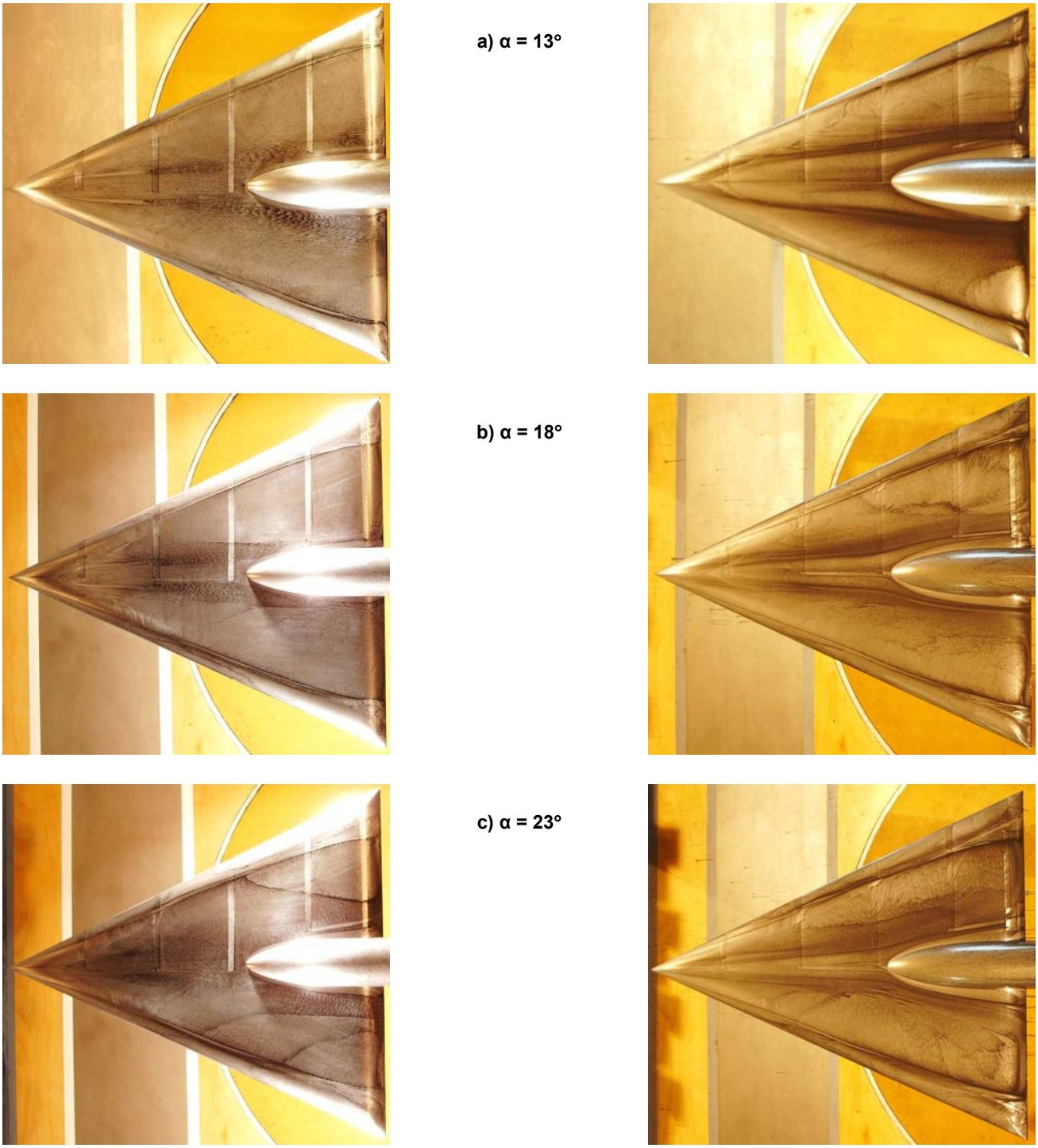
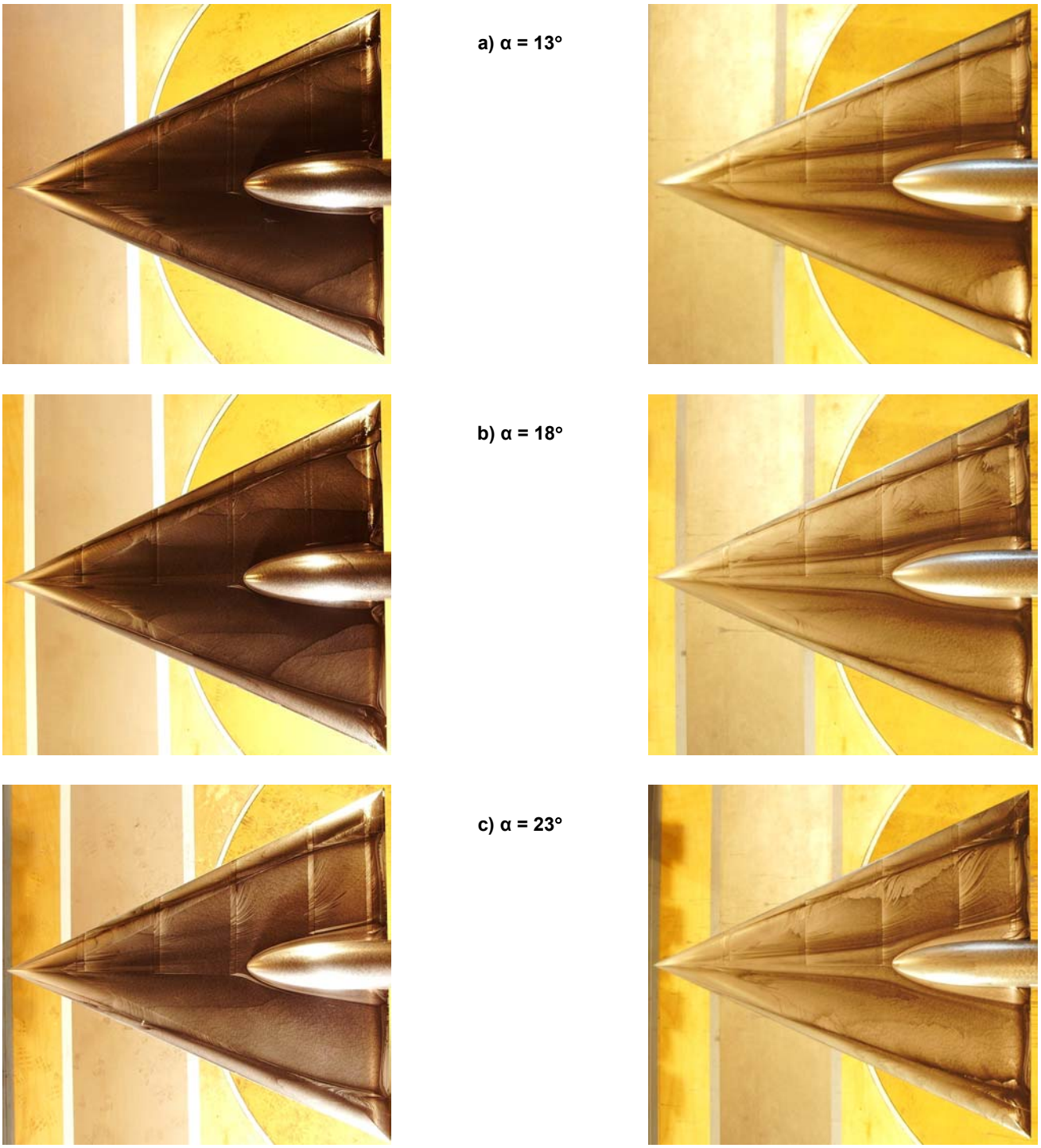


a) α = 13°

b) α = 18°

c) α = 23°

Figure A3.3-1: Surface Oil Flow Visualisation at R_{mac} = 1 x 10^6 and M = 0.07 for Sharp (left) and Rounded (right) Leading Edges – α = 13°, α = 18°, α = 23°.

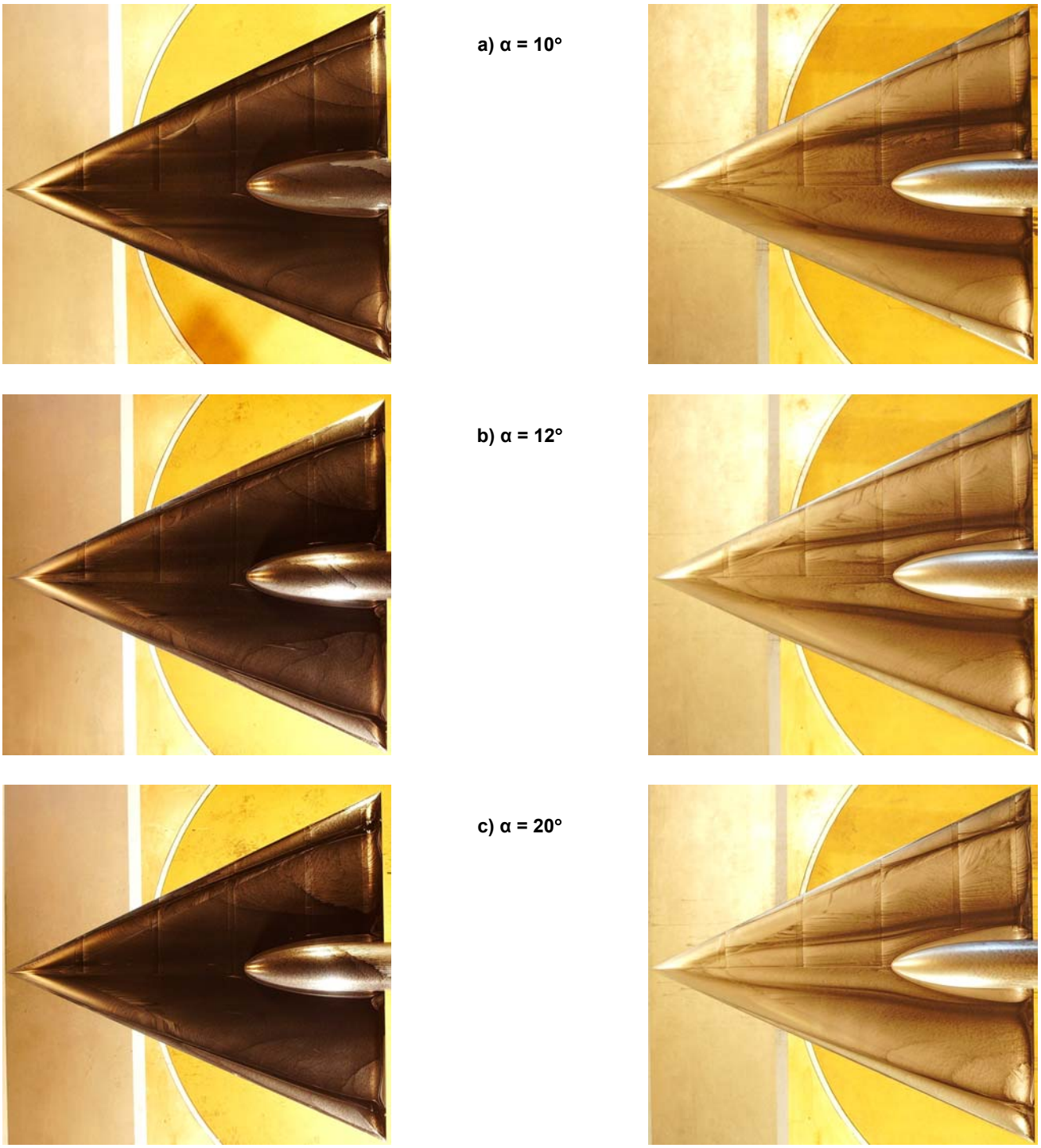


a) α = 13°

b) α = 18°

c) α = 23°

Figure A3.3-2: Surface Oil Flow Visualisation at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 13°, α = 18°, α = 23°.

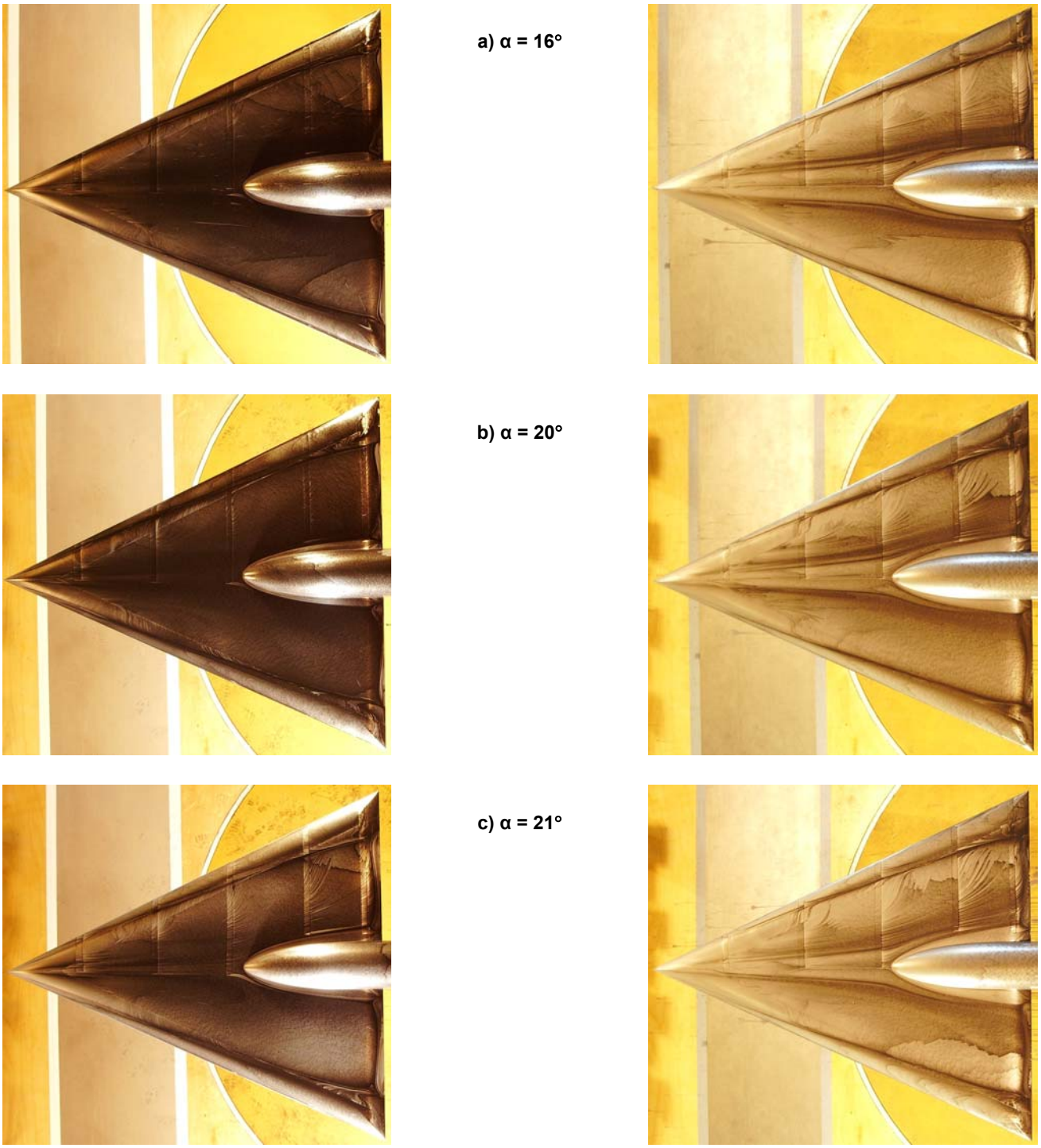


a) α = 10°

b) α = 12°

c) α = 20°

Figure A3.3-3: Surface Oil Flow Visualisation at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 10°, α = 12°, α = 20°.

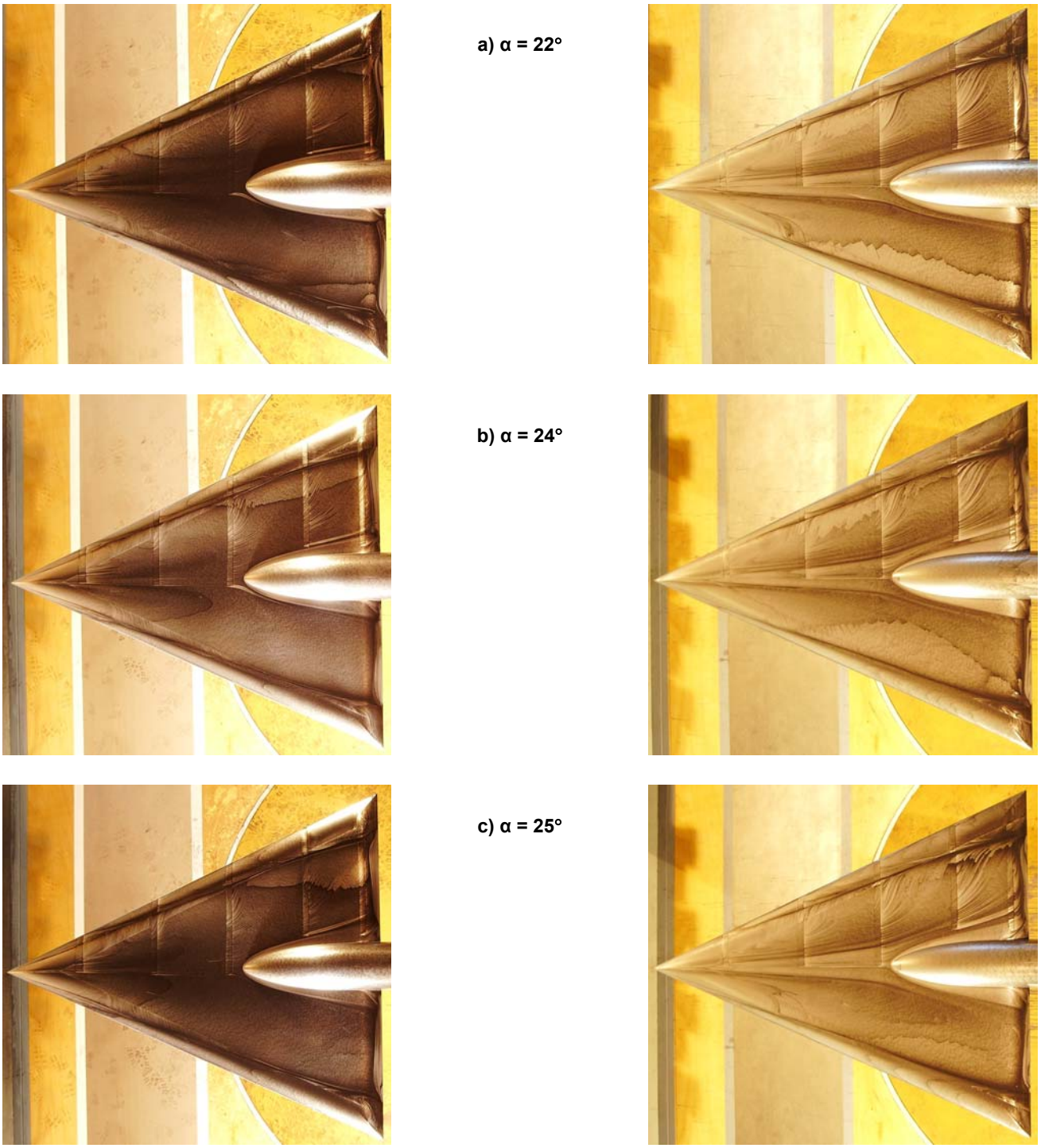


a) α = 16°

b) α = 20°

c) α = 21°

Figure A3.3-4: Surface Oil Flow Visualisation at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 16°, α = 20°, α = 21°.



a) α = 22°

b) α = 24°

c) α = 25°

Figure A3.3-5: Surface Oil Flow Visualisation at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 22°, α = 24°, α = 25°.

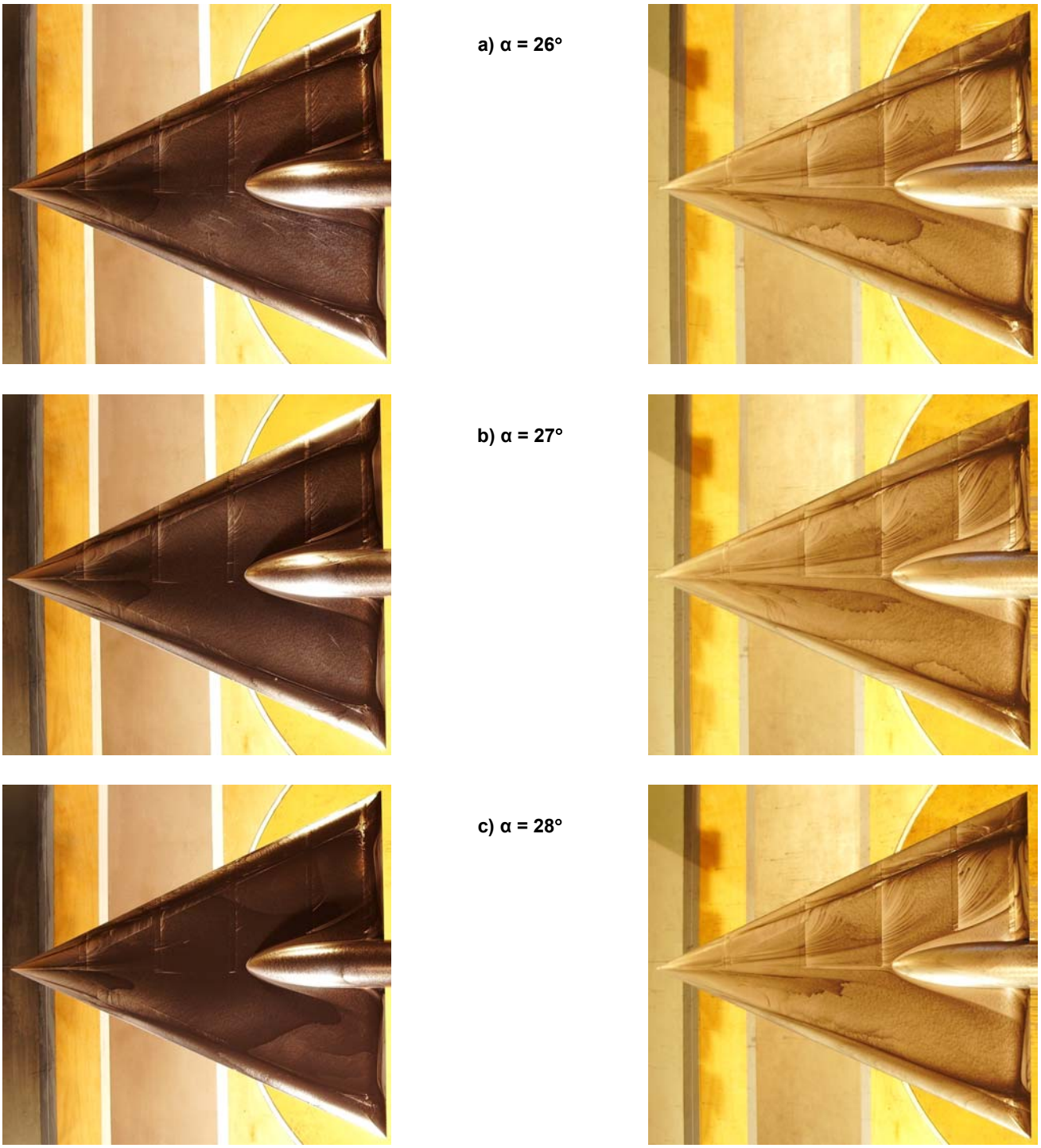
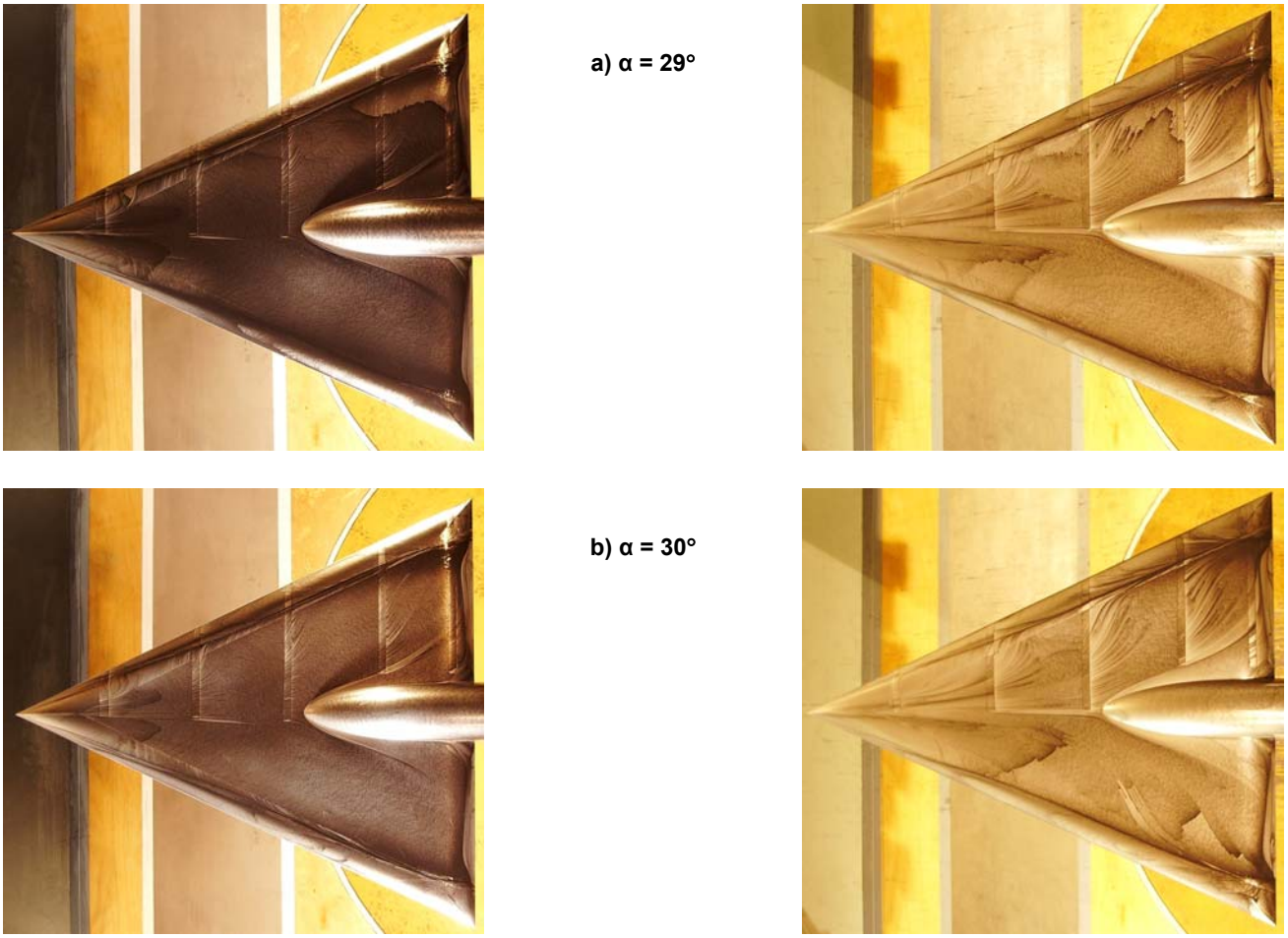


Figure A3.3-6: Surface Oil Flow Visualisation at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 26°, α = 27°, α = 28°.



a) α = 29°

b) α = 30°

Figure A3.3-7: Surface Oil Flow Visualisation at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 29°, α = 30°.

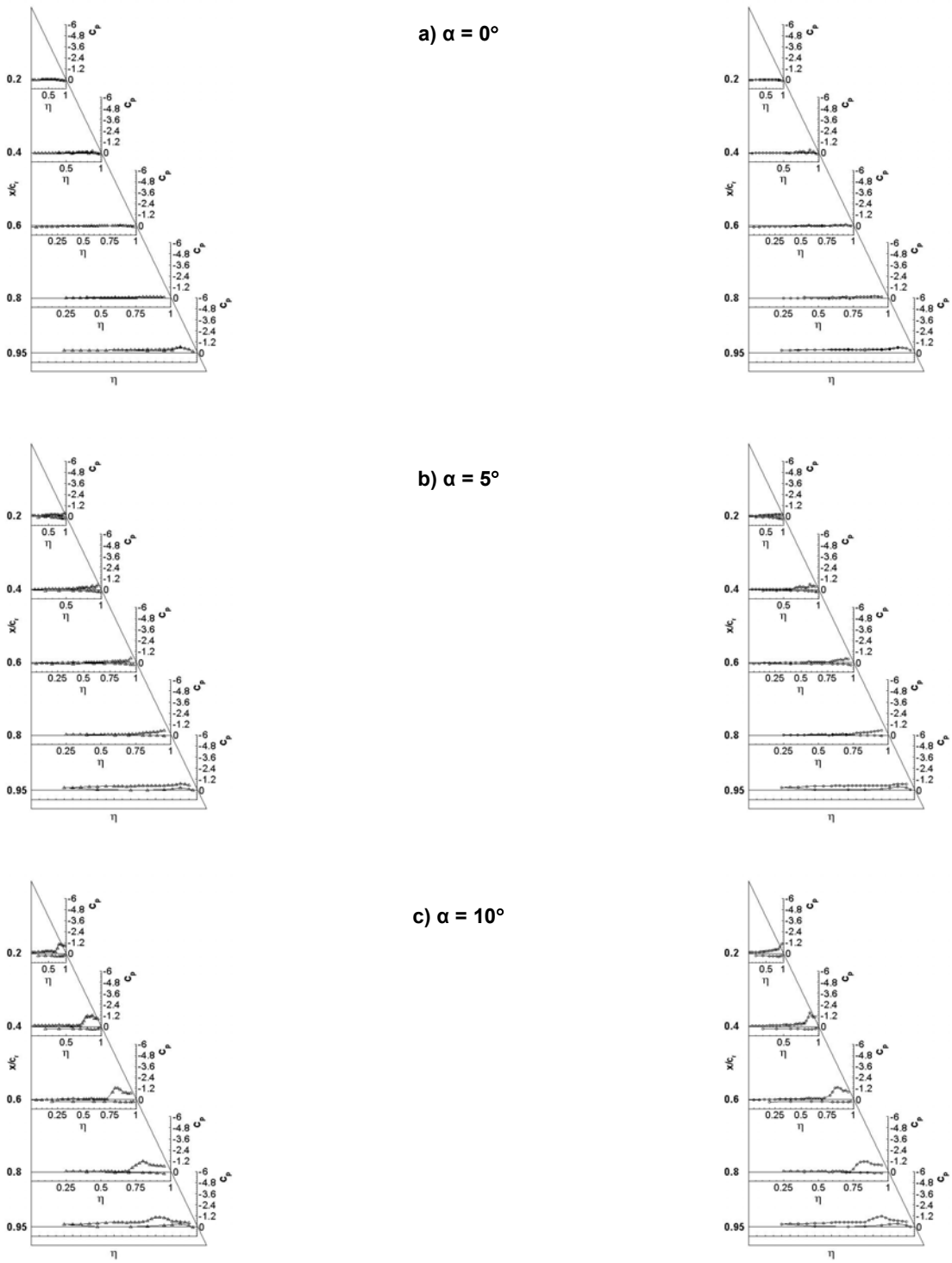


Figure A3.3-8: Steady Pressure Distribution at R_{mac} = 1 x 10^6 and M = 0.07 for Sharp (left) and Rounded (right) Leading Edges – α = 0°, α = 5°, α = 10°.

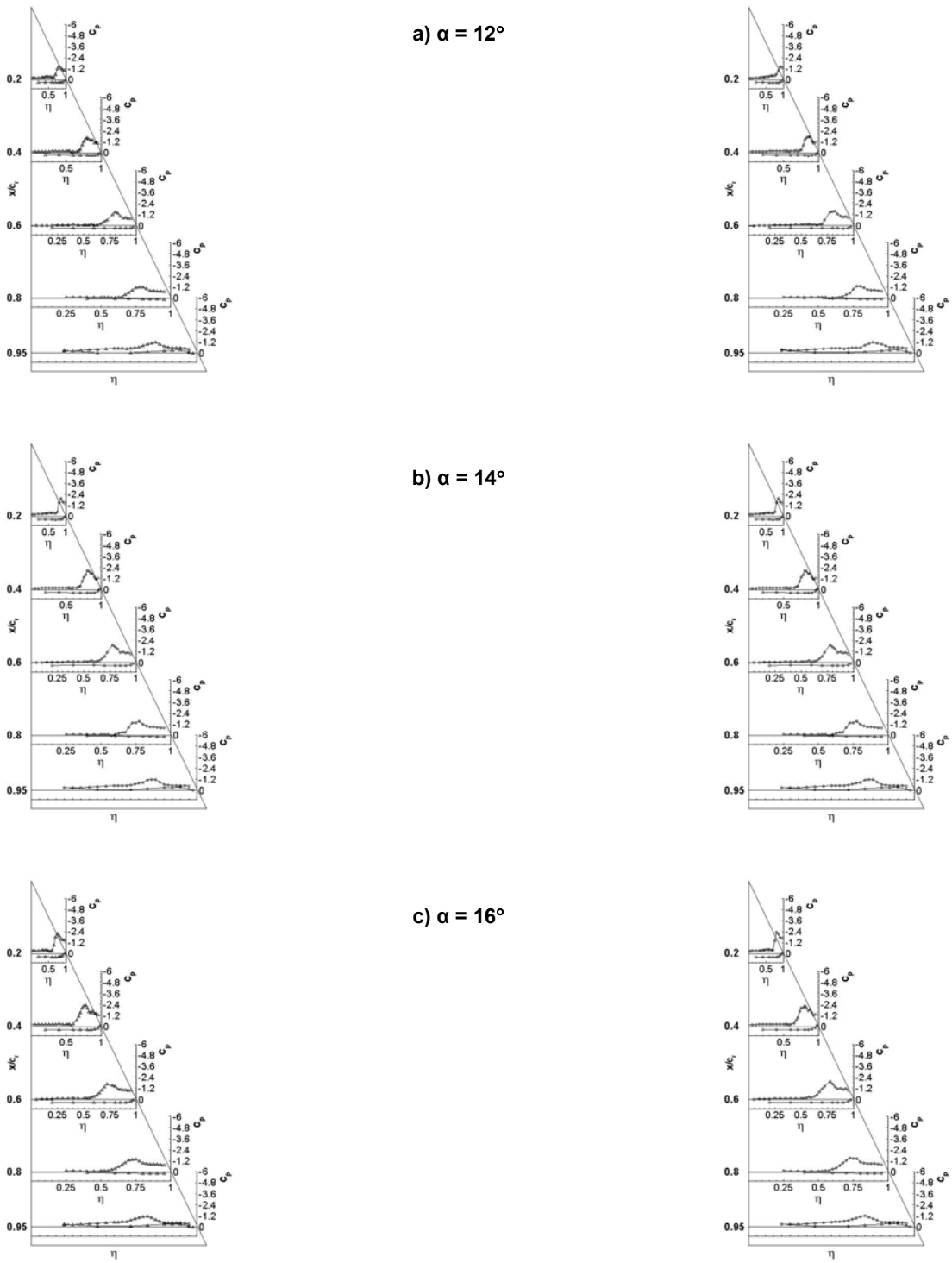


Figure A3.3-9: Steady Pressure Distribution at R_{mac} = 1 x 10^6 and M = 0.07 for Sharp (left) and Rounded (right) Leading Edges – α = 12°, α = 14°, α = 16°.

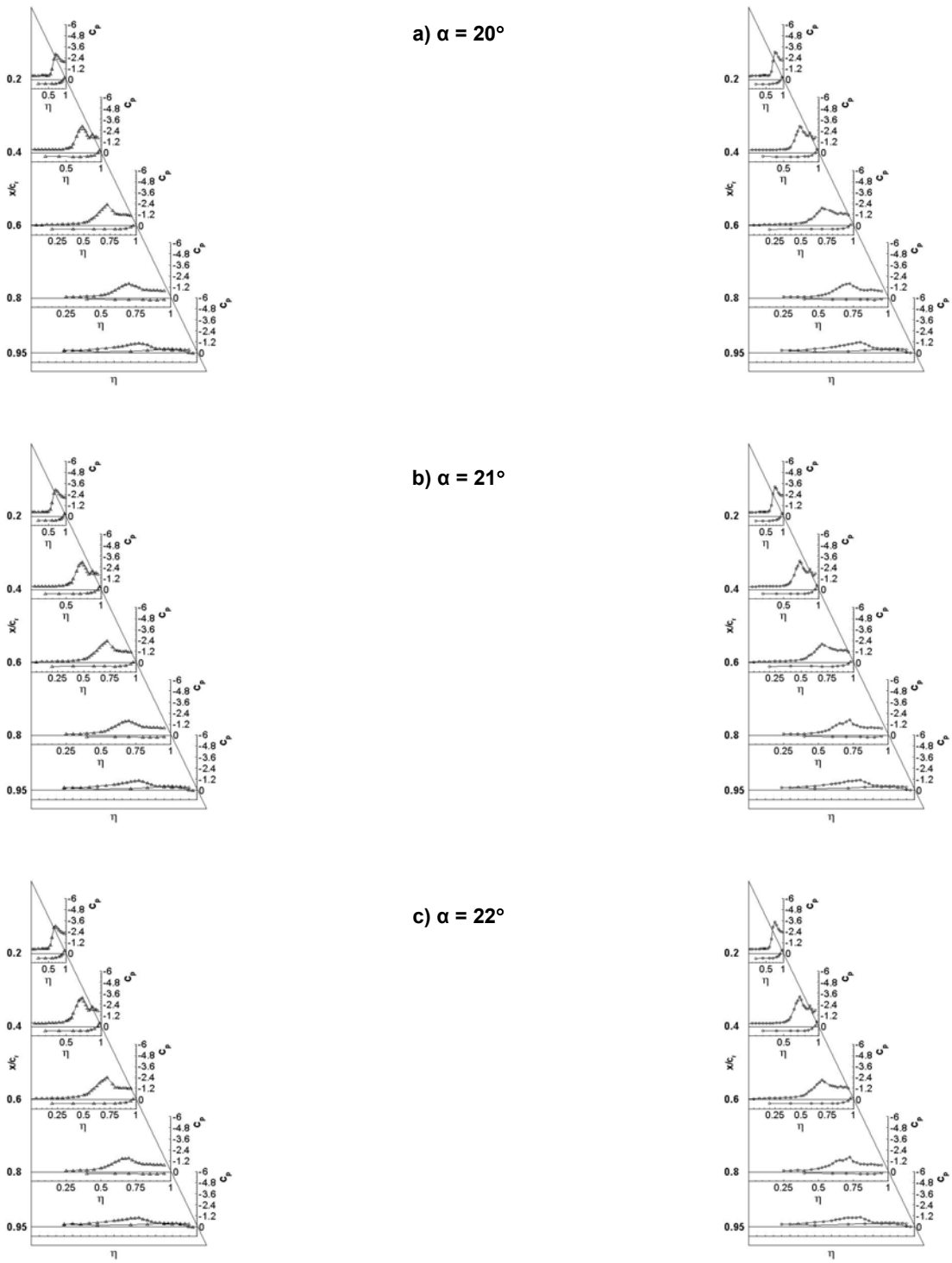


Figure A3.3-10: Steady Pressure Distribution at R_{mac} = 1 x 10^6 and M = 0.07 for Sharp (left) and Rounded (right) Leading Edges – α = 20°, α = 21°, α = 22°.

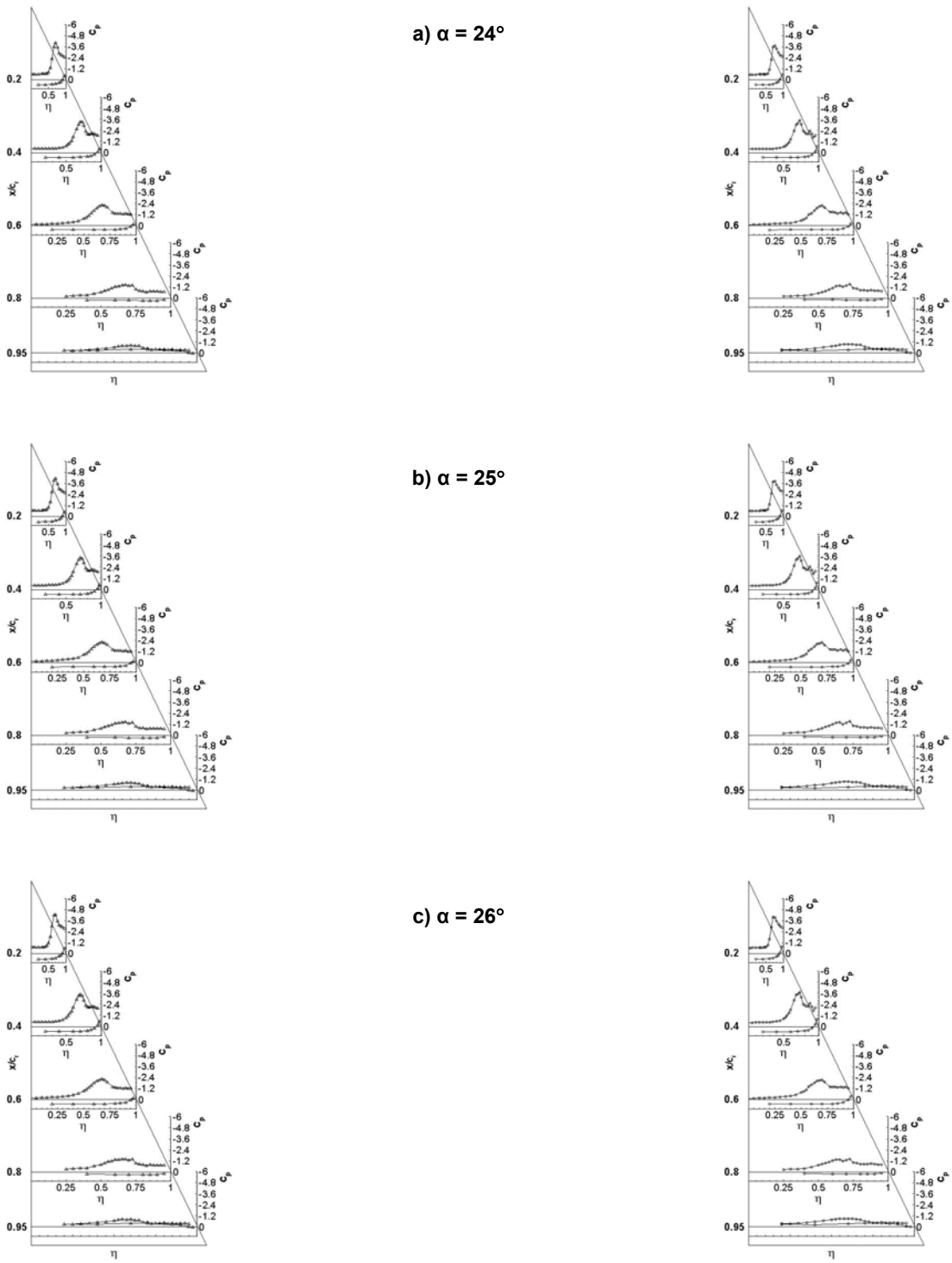


Figure A3.3-11: Steady Pressure Distribution at R_{mac} = 1 x 10^6 and M = 0.07 for Sharp (left) and Rounded (right) Leading Edges – α = 24°, α = 25°, α = 26°.

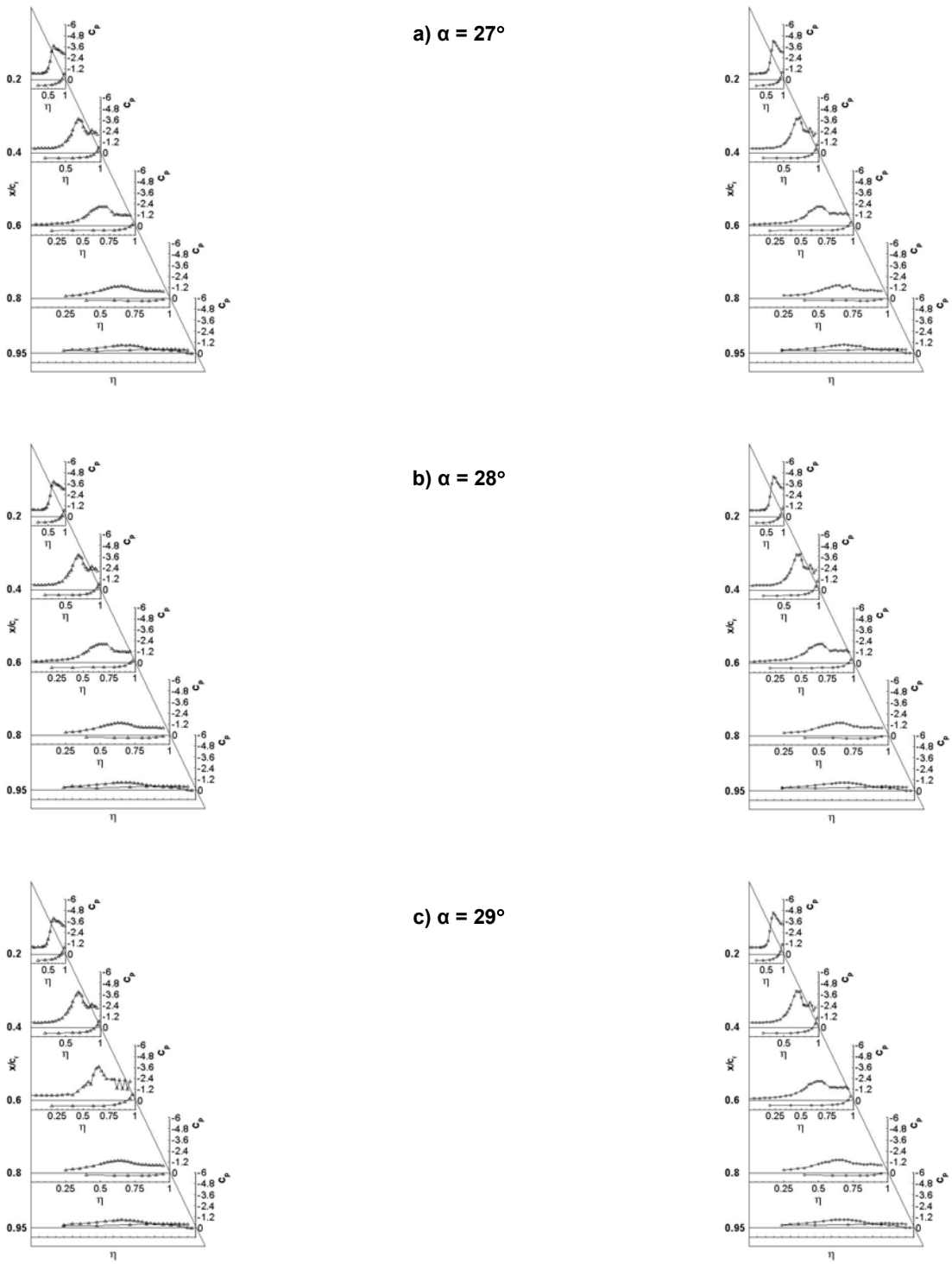


Figure A3.3-12: Steady Pressure Distribution at R_{mac} = 1 x 10^6 and M = 0.07 for Sharp (left) and Rounded (right) Leading Edges – α = 27°, α = 28°, α = 29°.

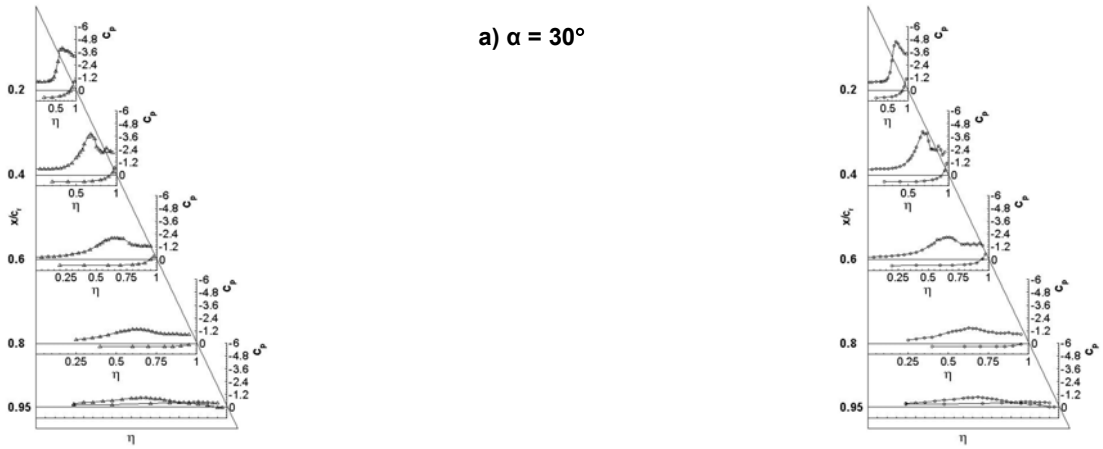


Figure A3.3-13: Steady Pressure Distribution at R_{mac} = 1 x 10^6 and M = 0.07 for Sharp (left) and Rounded (right) Leading Edges – α = 30°.

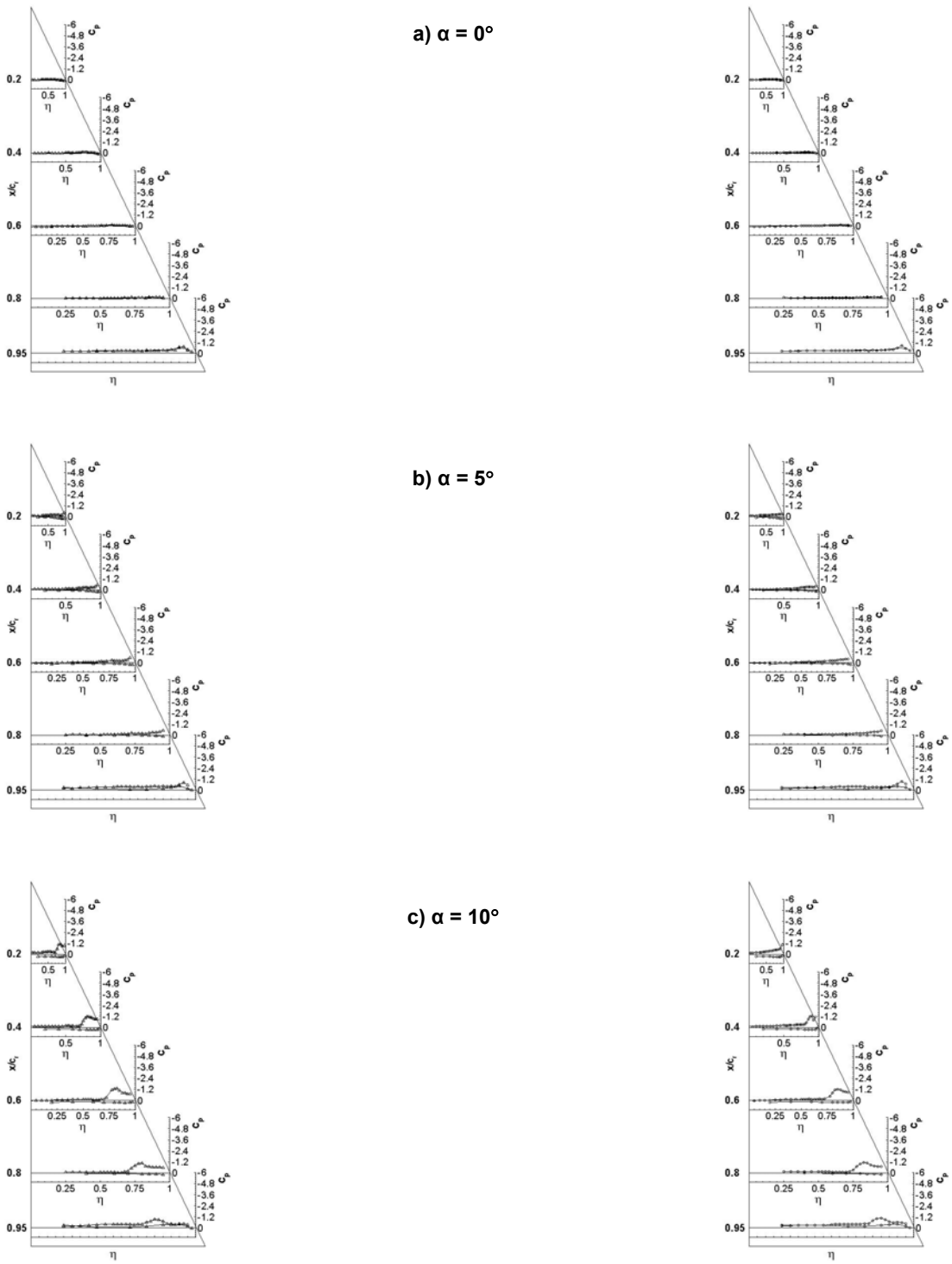


Figure A3.3-14: Steady Pressure Distribution at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 0°, α = 5°, α = 10°.

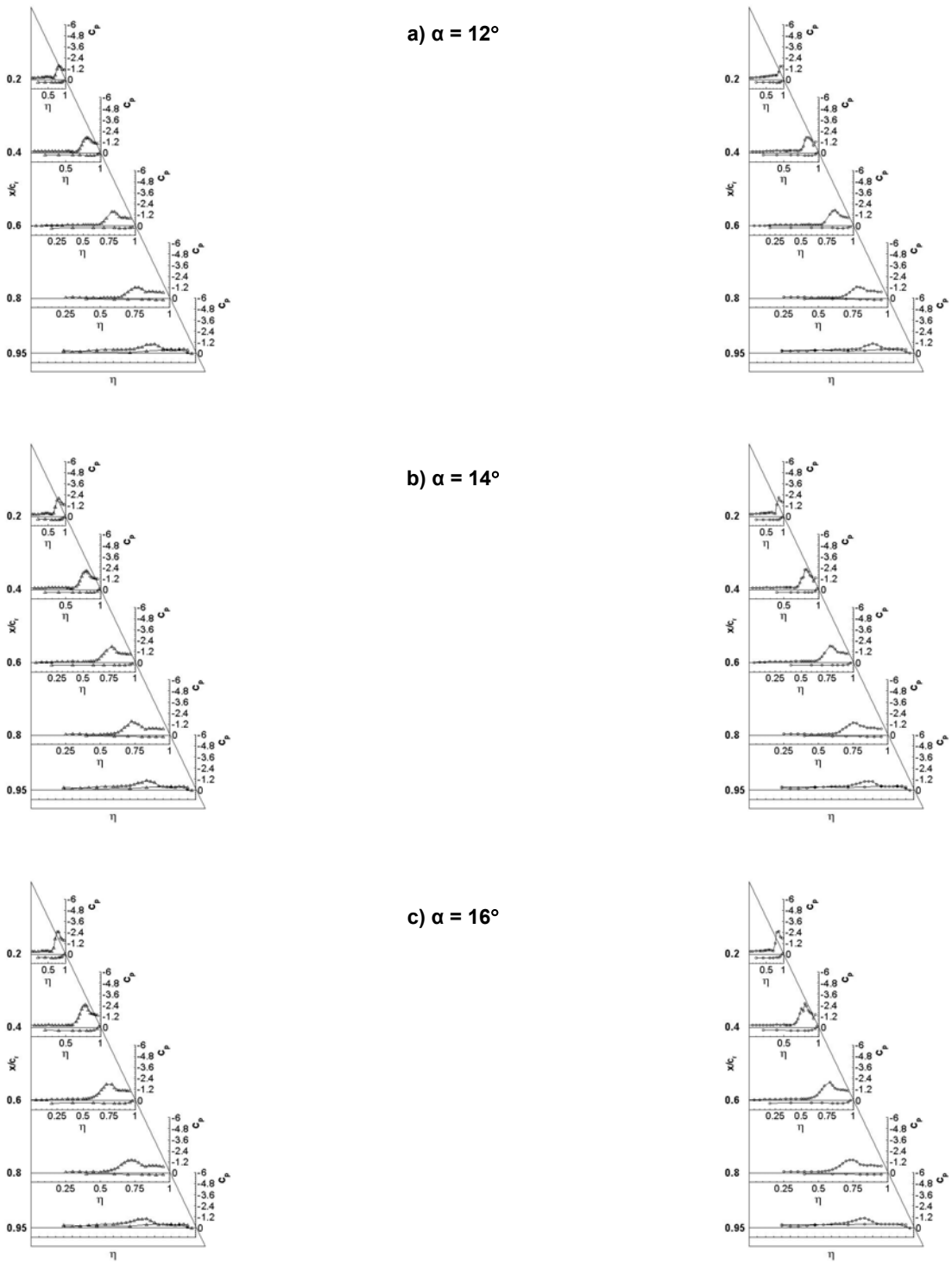


Figure A3.3-15: Steady Pressure Distribution at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 12°, α = 14°, α = 16°.

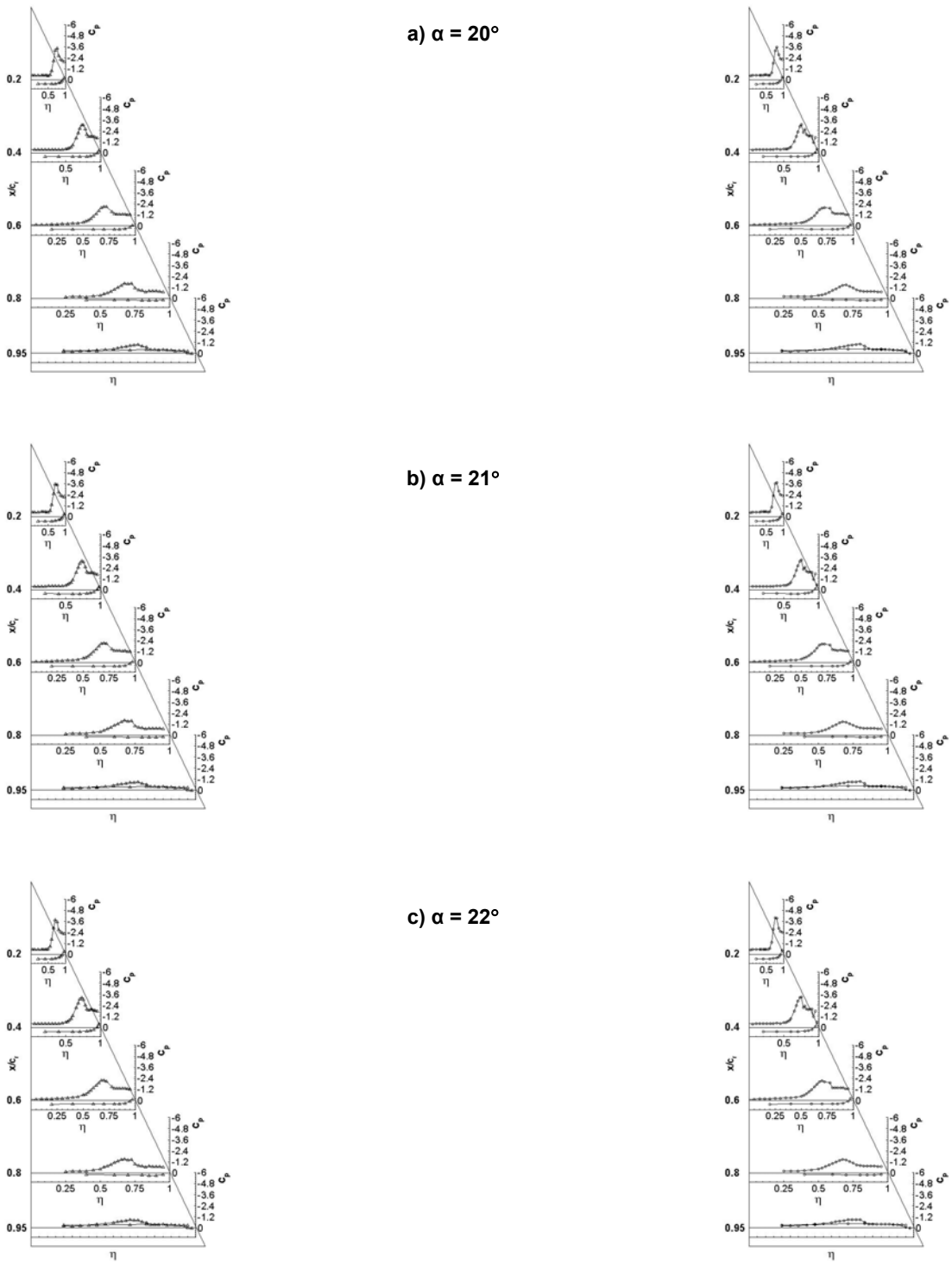


Figure A3.3-16: Steady Pressure Distribution at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 20°, α = 21°, α = 22°.

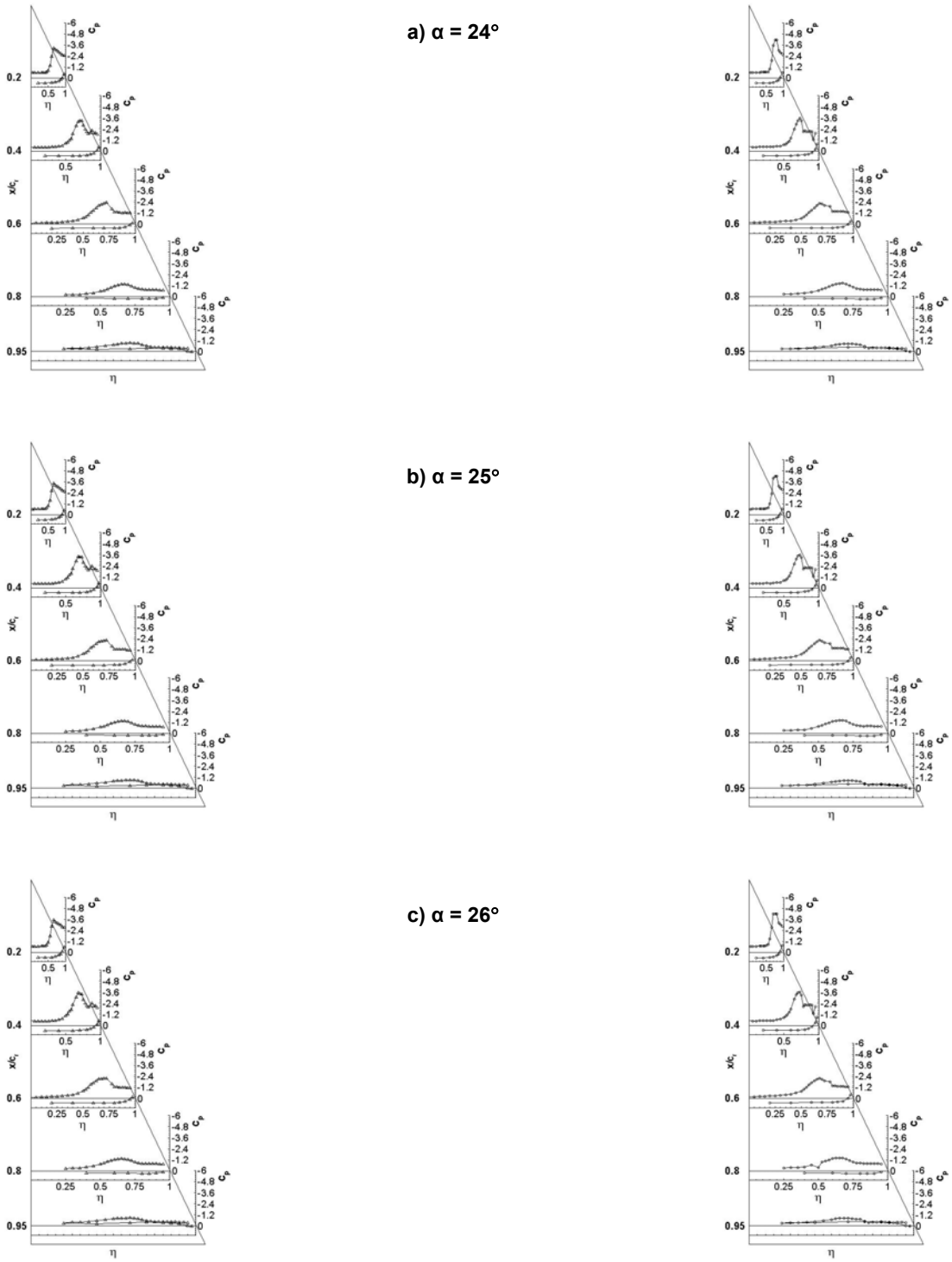


Figure A3.3-17: Steady Pressure Distribution at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 24°, α = 25°, α = 26°.

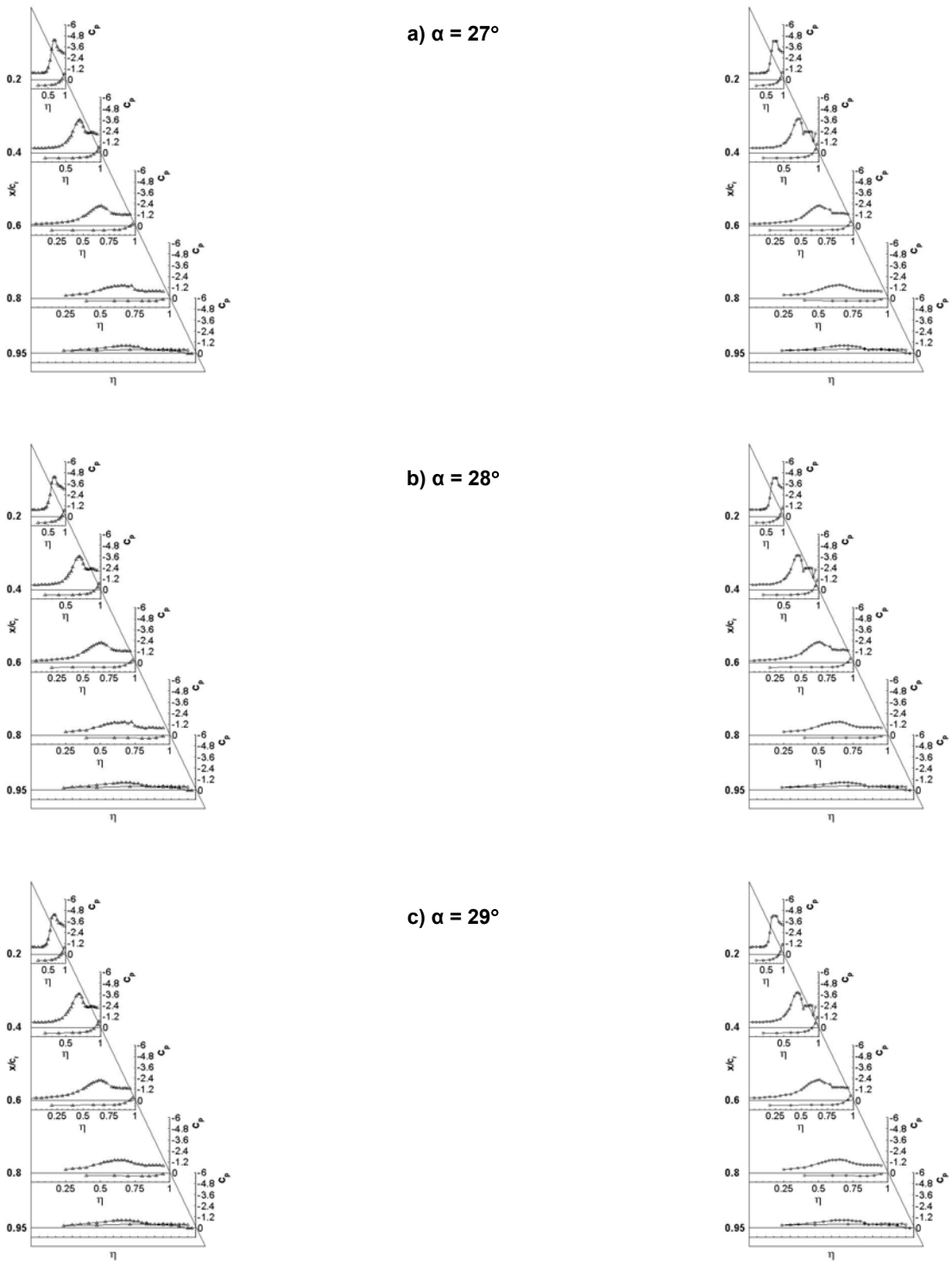
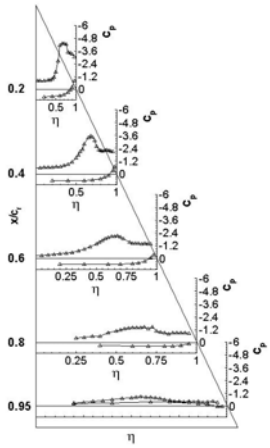


Figure A3.3-18: Steady Pressure Distribution at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 27°, α = 28°, α = 29°.



a) α = 30°

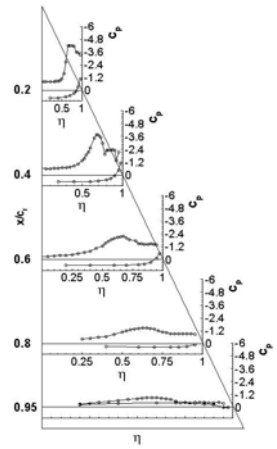


Figure A3.3-19: Steady Pressure Distribution at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 30°.

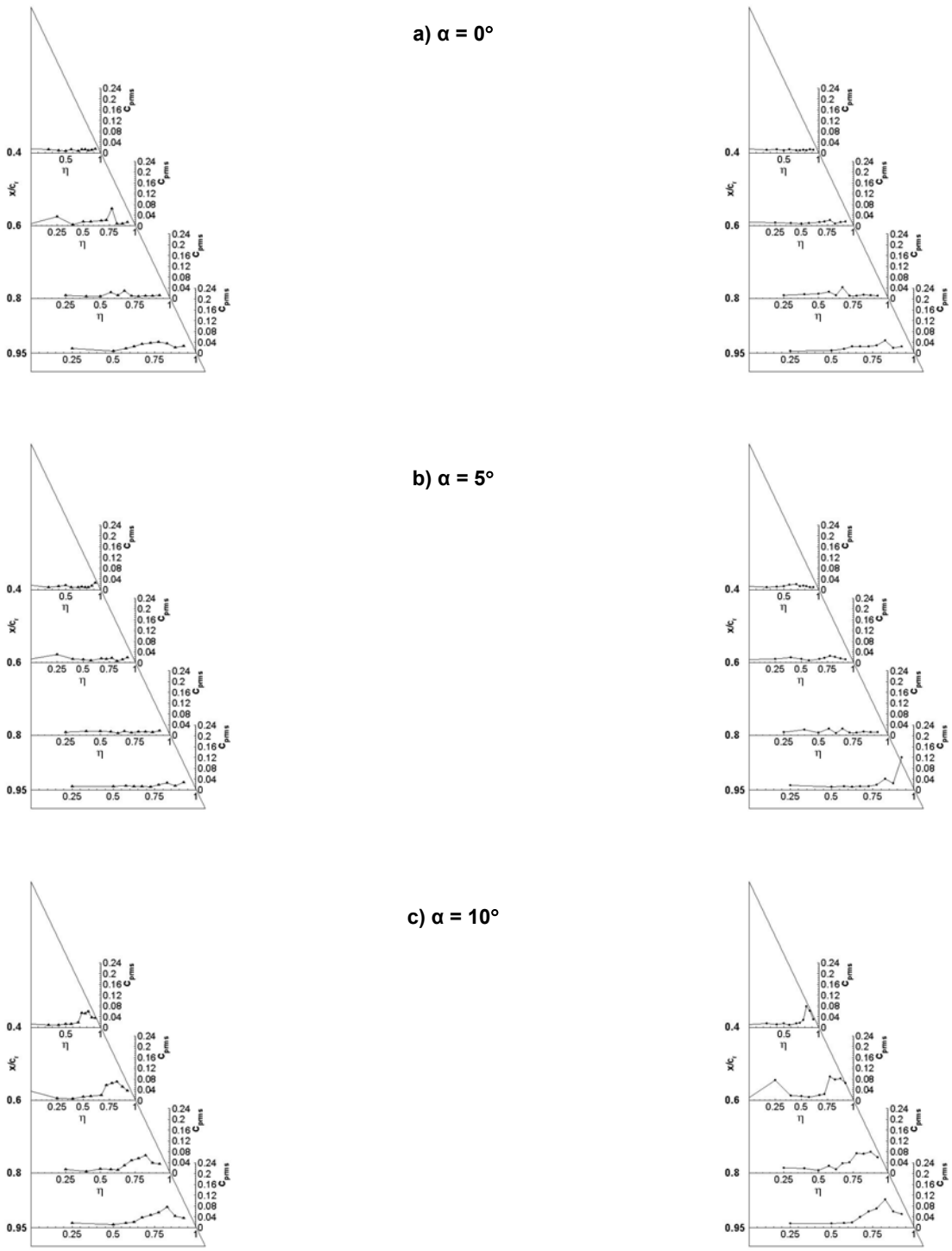


Figure A3.3-20: Pressure Fluctuation Intensity at R_{mac} = 1 x 10^6 and M = 0.07 for Sharp (left) and Rounded (right) Leading Edges – α = 0°, α = 5°, α = 10°.

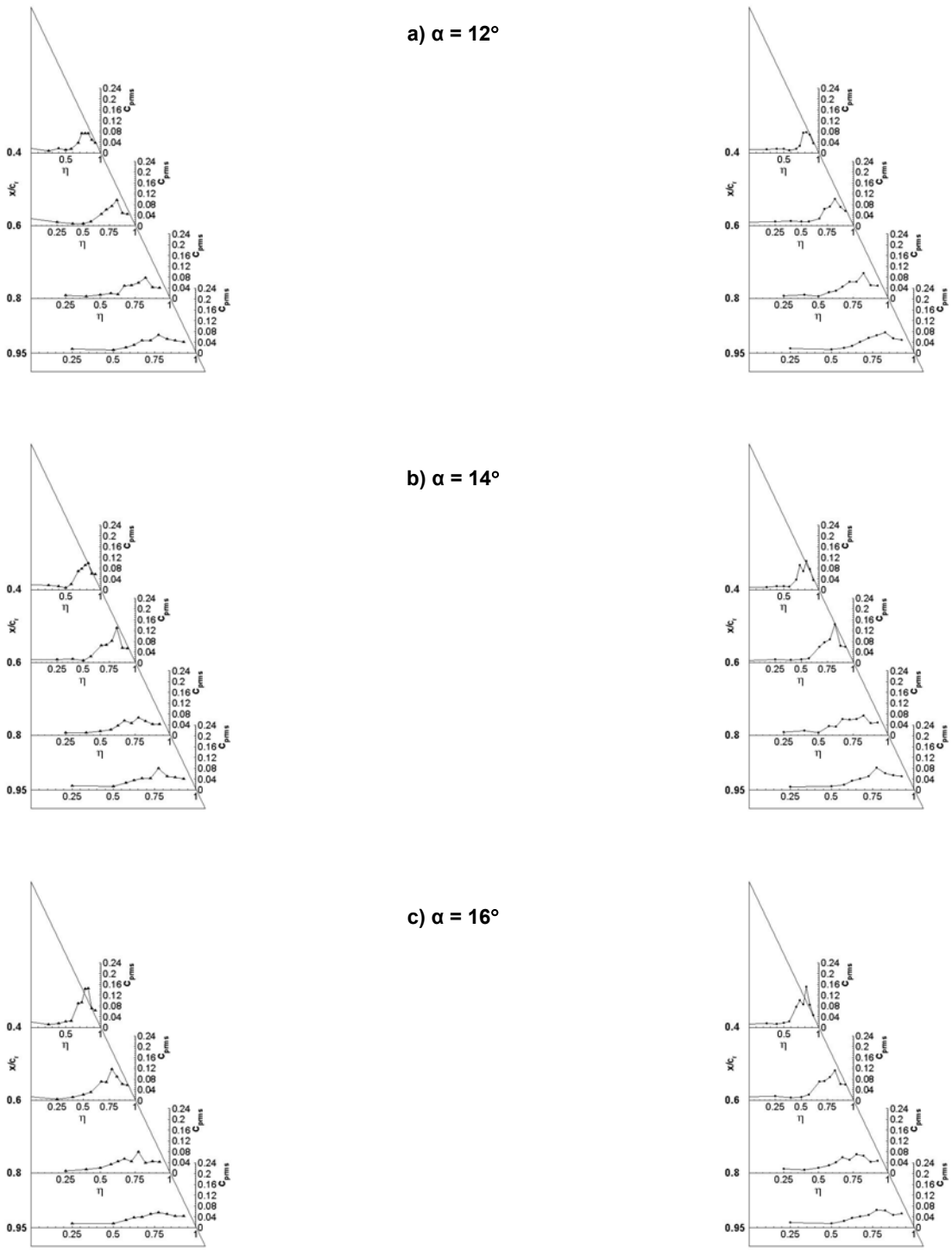


Figure A3.3-21: Pressure Fluctuation Intensity at R_{mac} = 1 x 10^6 and M = 0.07 for Sharp (left) and Rounded (right) Leading Edges – α = 12°, α = 14°, α = 16°.

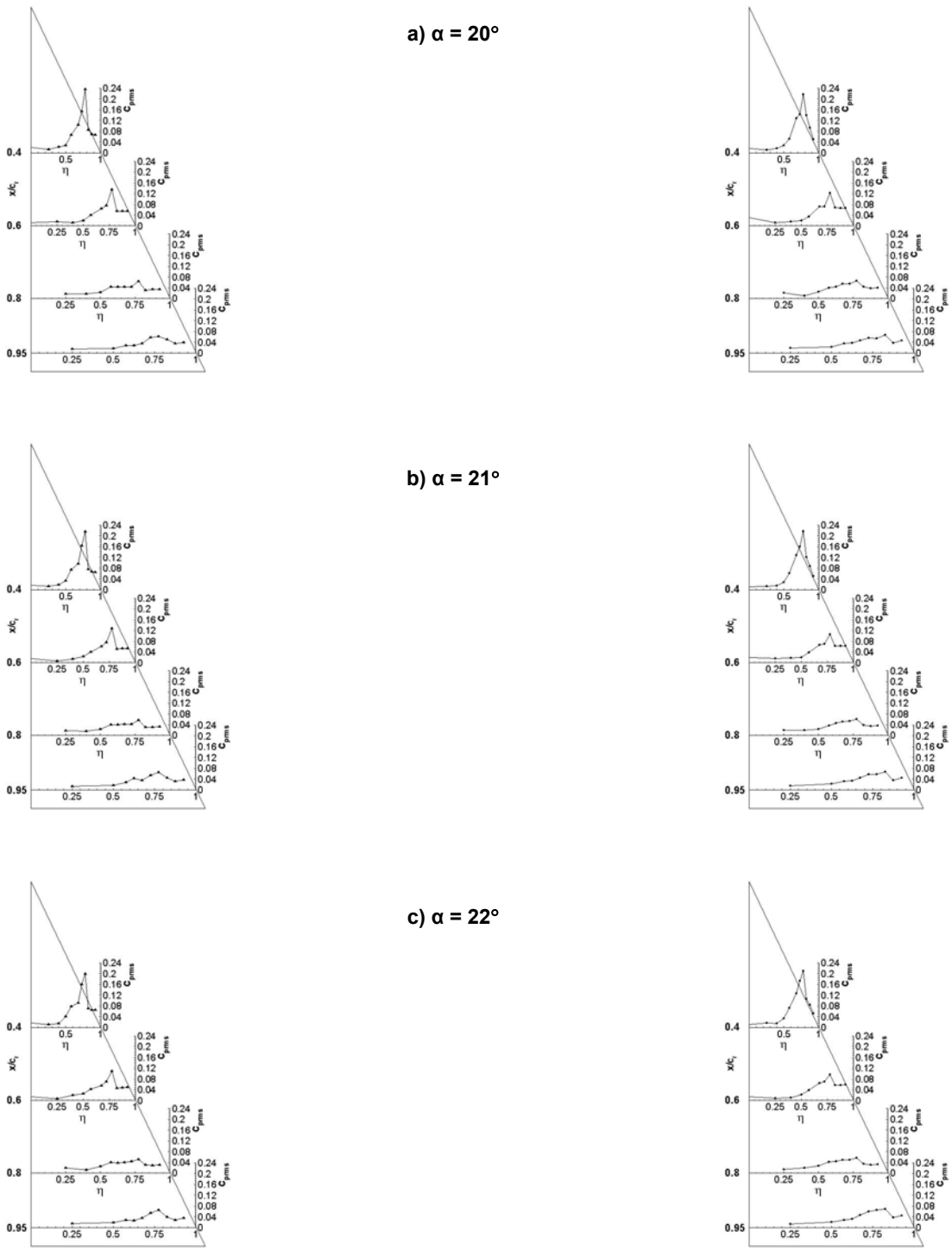


Figure A3.3-22: Pressure Fluctuation Intensity at R_{mac} = 1 x 10^6 and M = 0.07 for Sharp (left) and Rounded (right) Leading Edges – α = 20°, α = 21°, α = 22°.

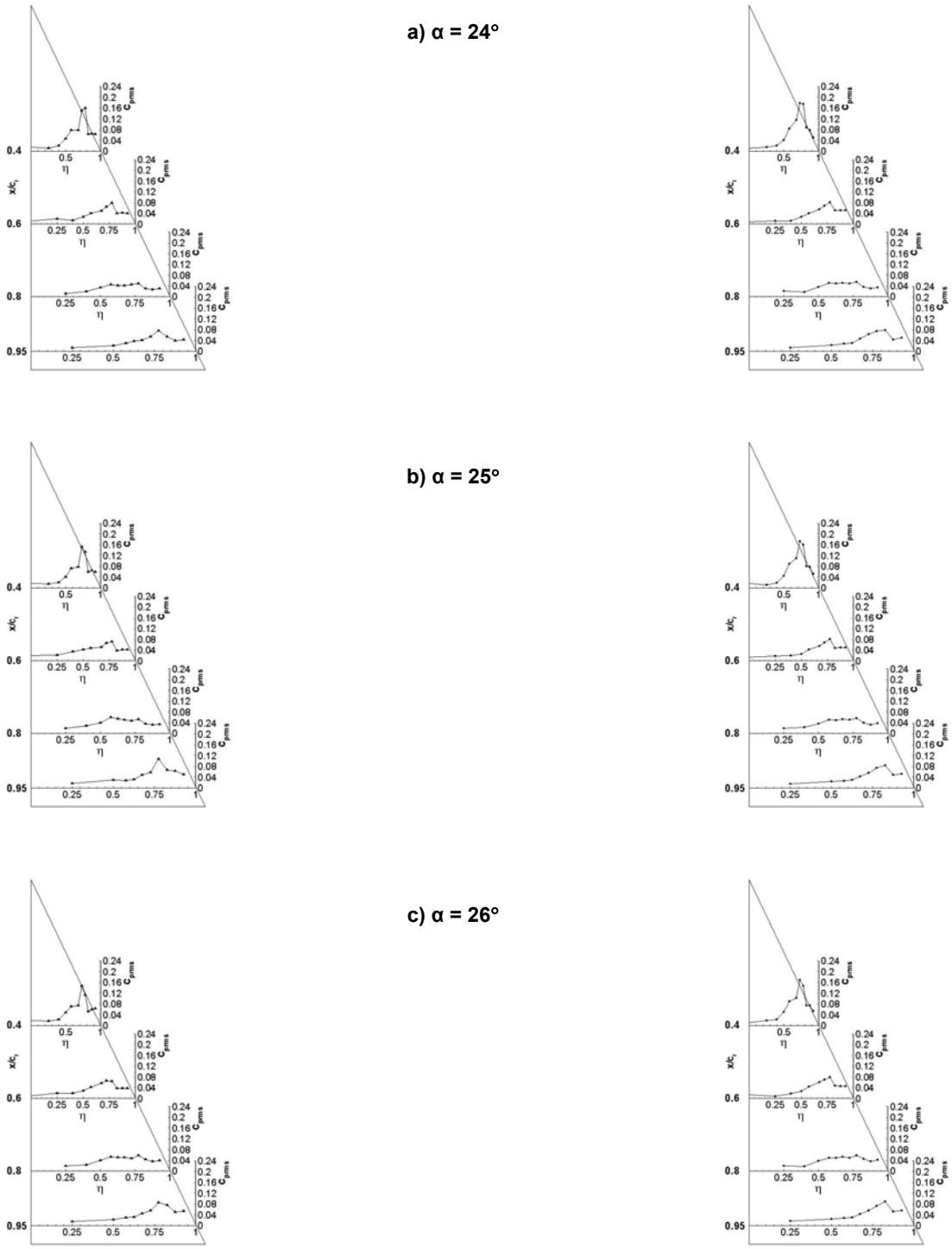


Figure A3.3-23: Pressure Fluctuation Intensity at R_{mac} = 1 x 10^6 and M = 0.07 for Sharp (left) and Rounded (right) Leading Edges – α = 24°, α = 25°, α = 26°.

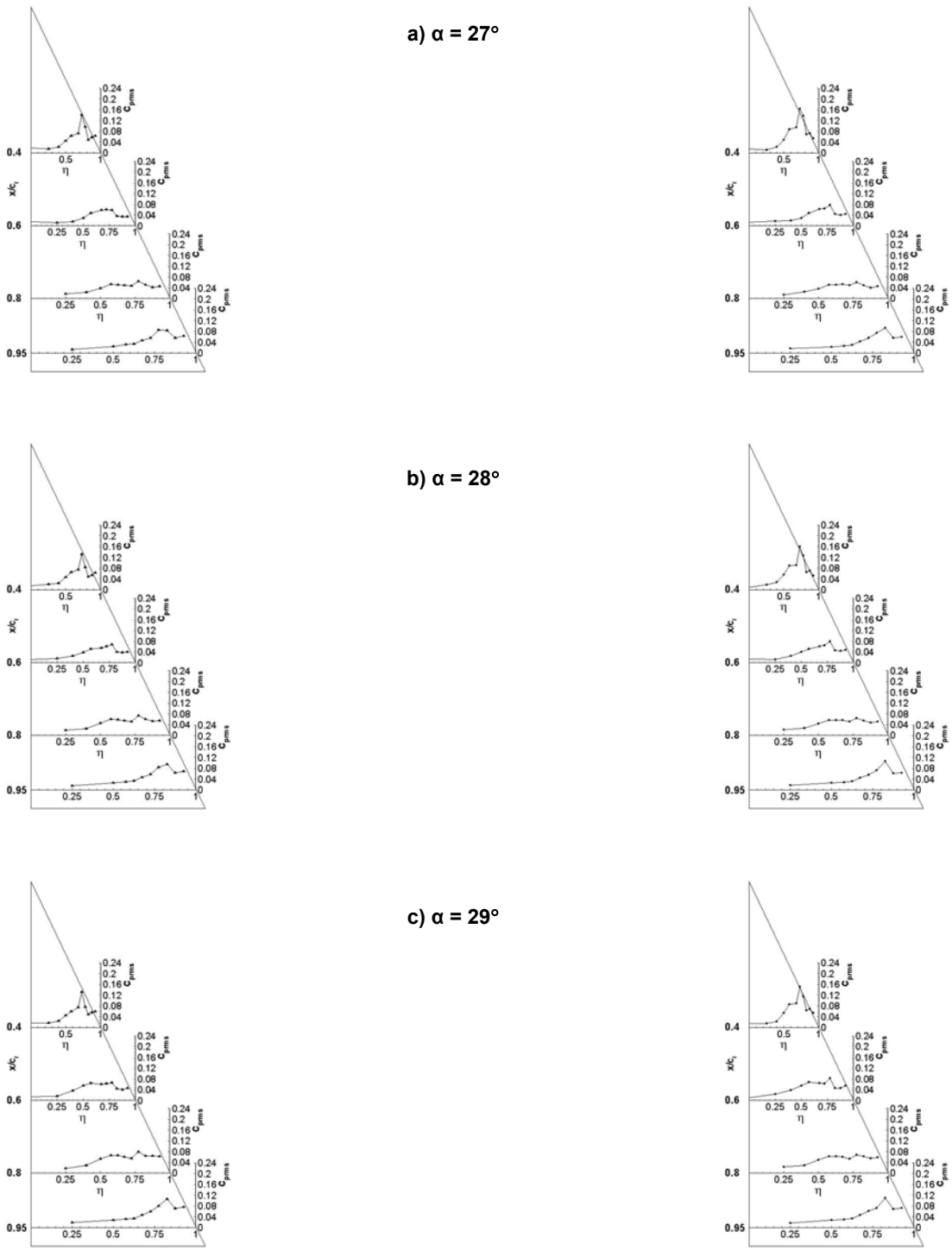


Figure A3.3-24: Pressure Fluctuation Intensity at R_{mac} = 1 x 10^6 and M = 0.07 for Sharp (left) and Rounded (right) Leading Edges – α = 27°, α = 28°, α = 29°.

a) α = 30°

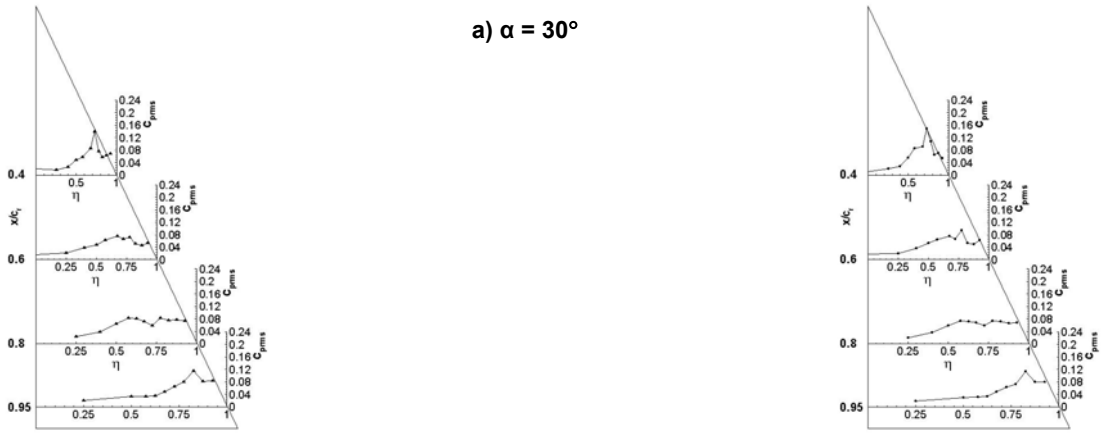


Figure A3.3-25: Pressure Fluctuation Intensity at R_{mac} = 1 x 10^6 and M = 0.07 for Sharp (left) and Rounded (right) Leading Edges – α = 30°.

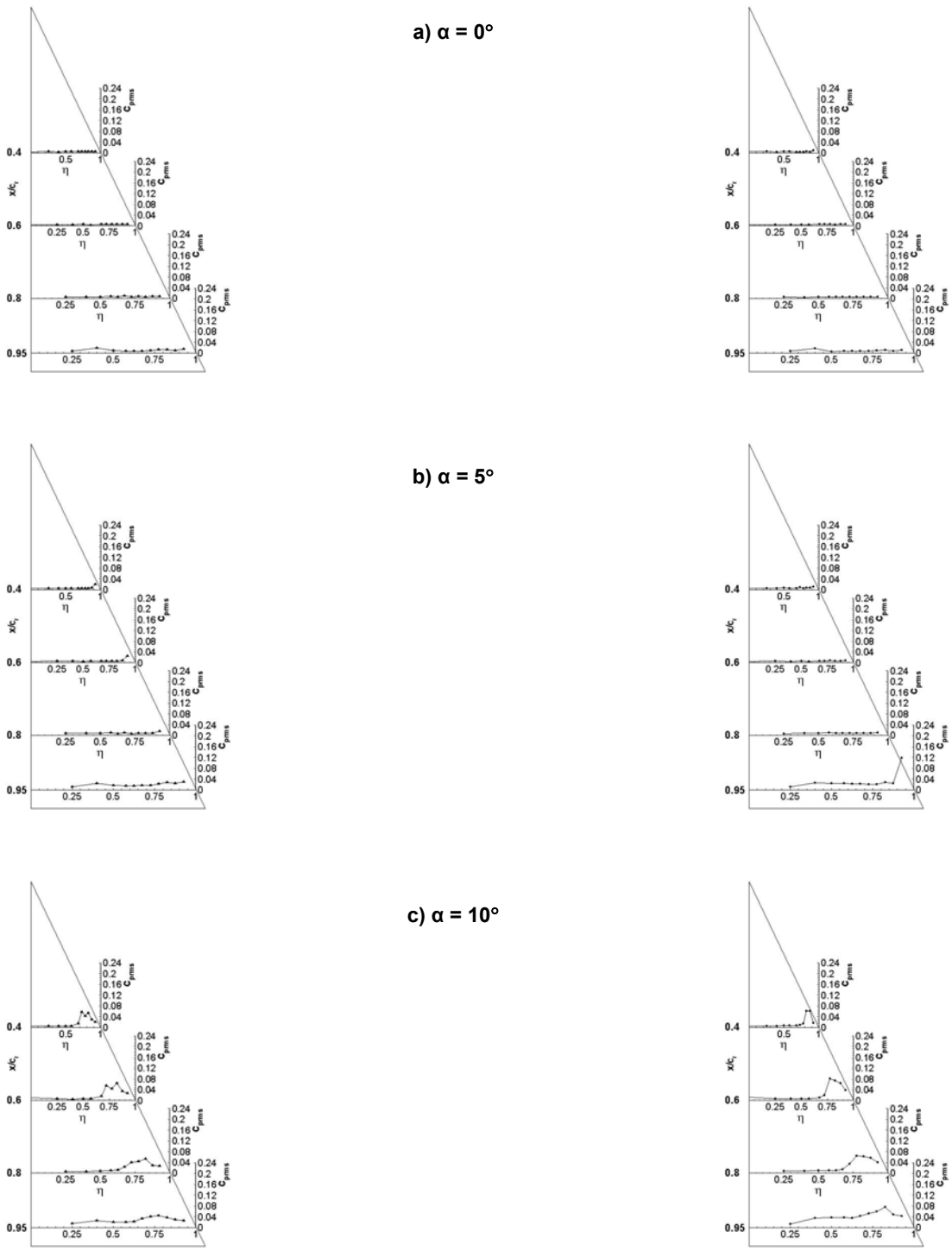


Figure A3.3-26: Pressure Fluctuation Intensity at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 0°, α = 5°, α = 10°.

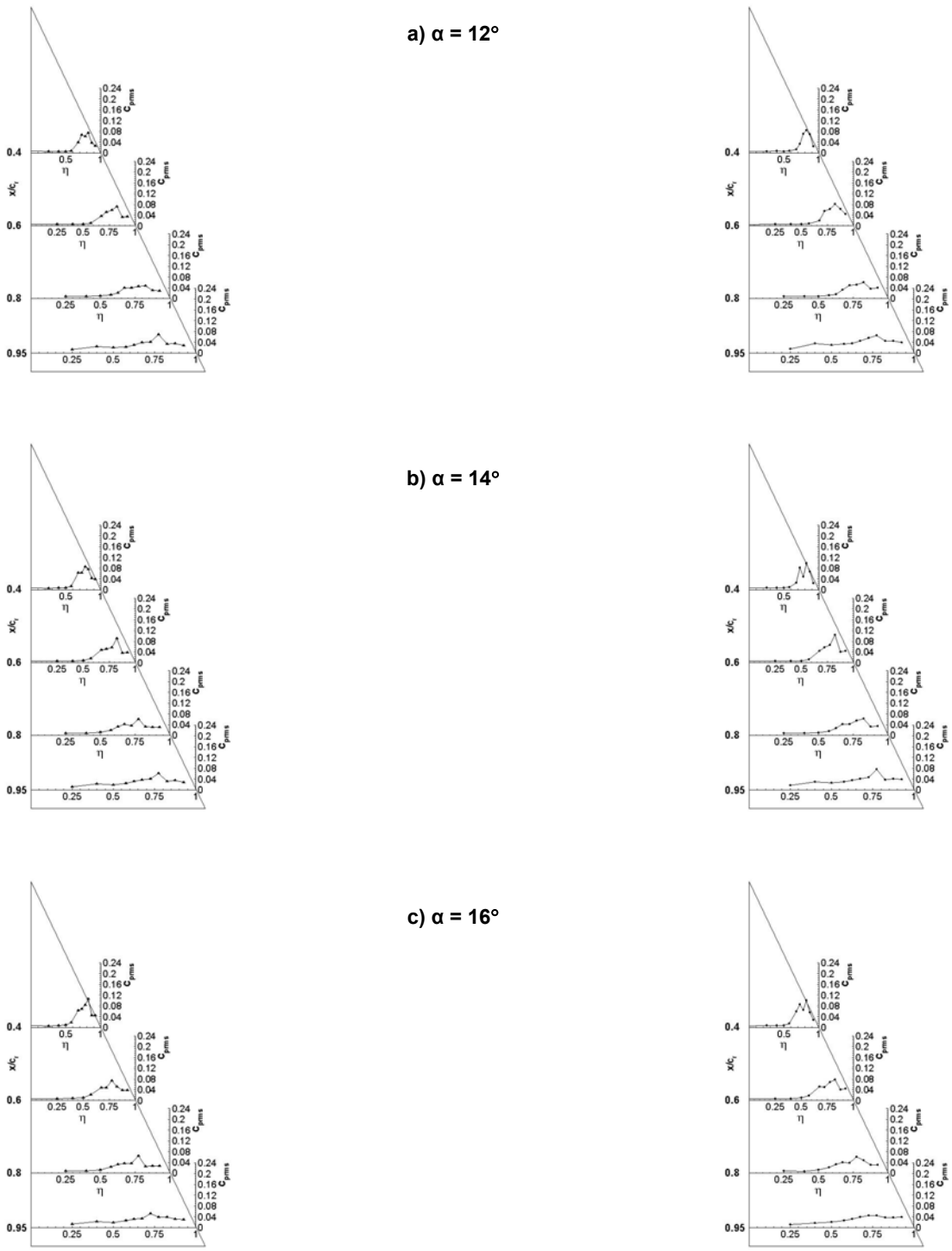


Figure A3.3-27: Pressure Fluctuation Intensity at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 12°, α = 14°, α = 16°.

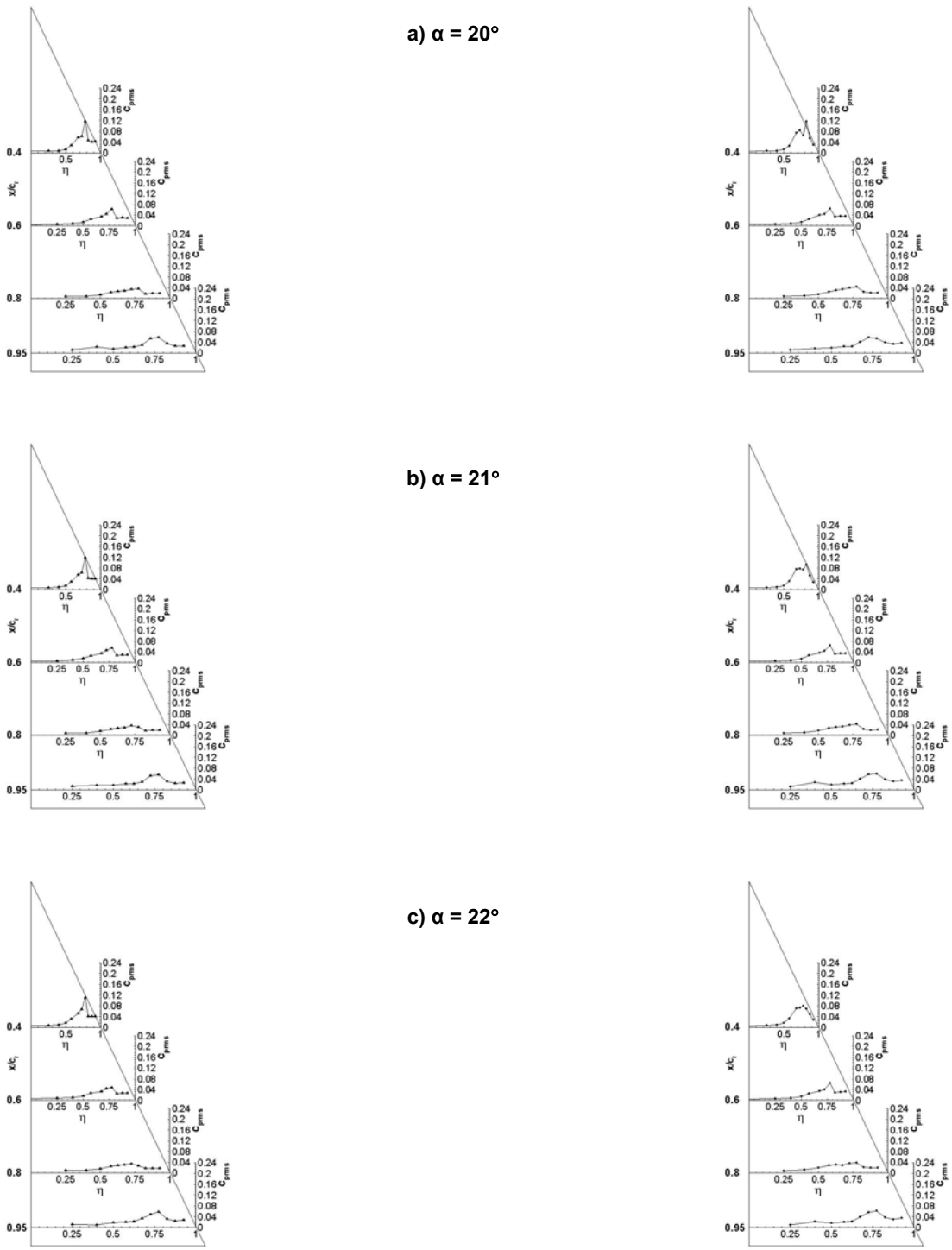


Figure A3.3-28: Pressure Fluctuation Intensity at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 20°, α = 21°, α = 22°.

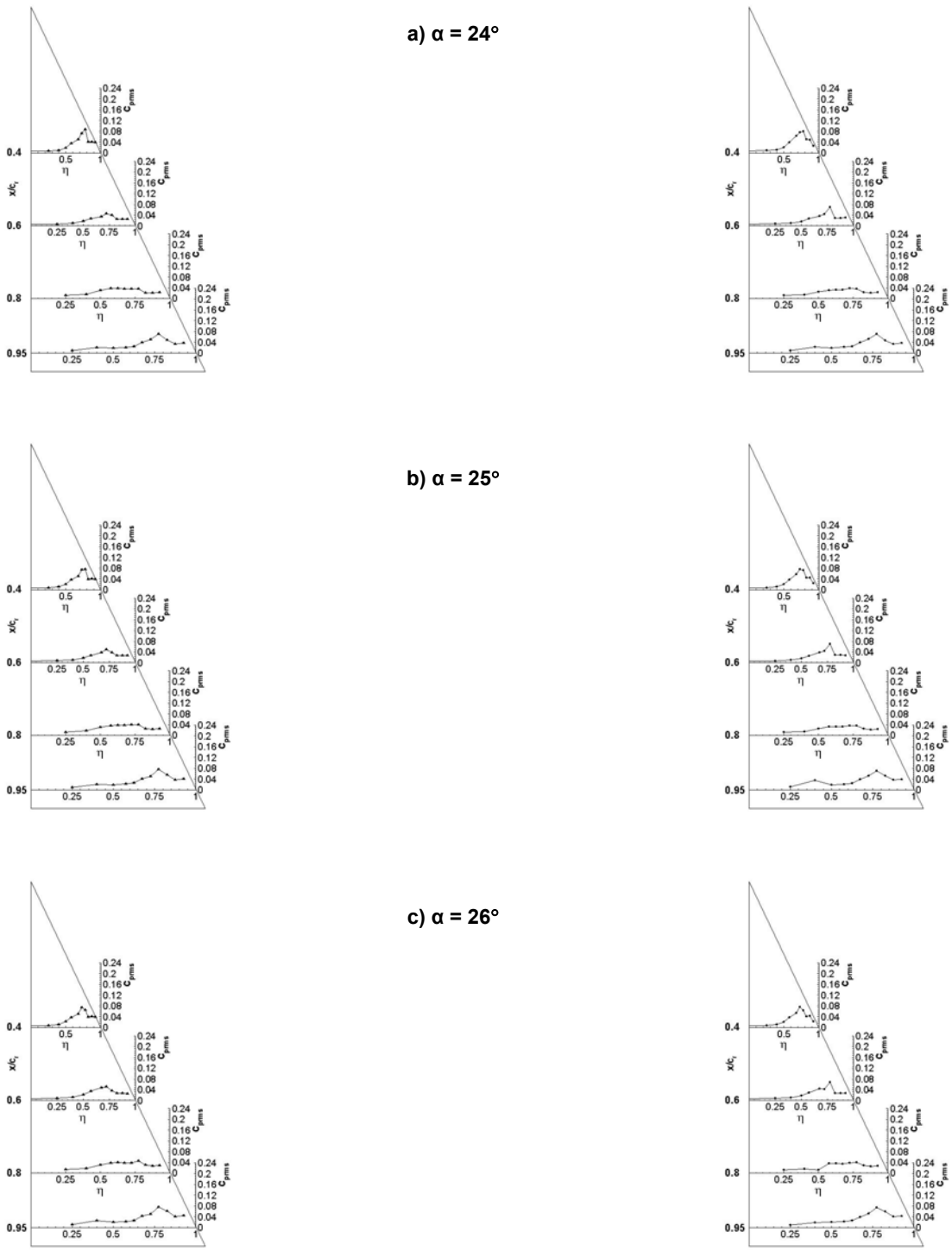


Figure A3.3-29: Pressure Fluctuation Intensity at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 24°, α = 25°, α = 26°.

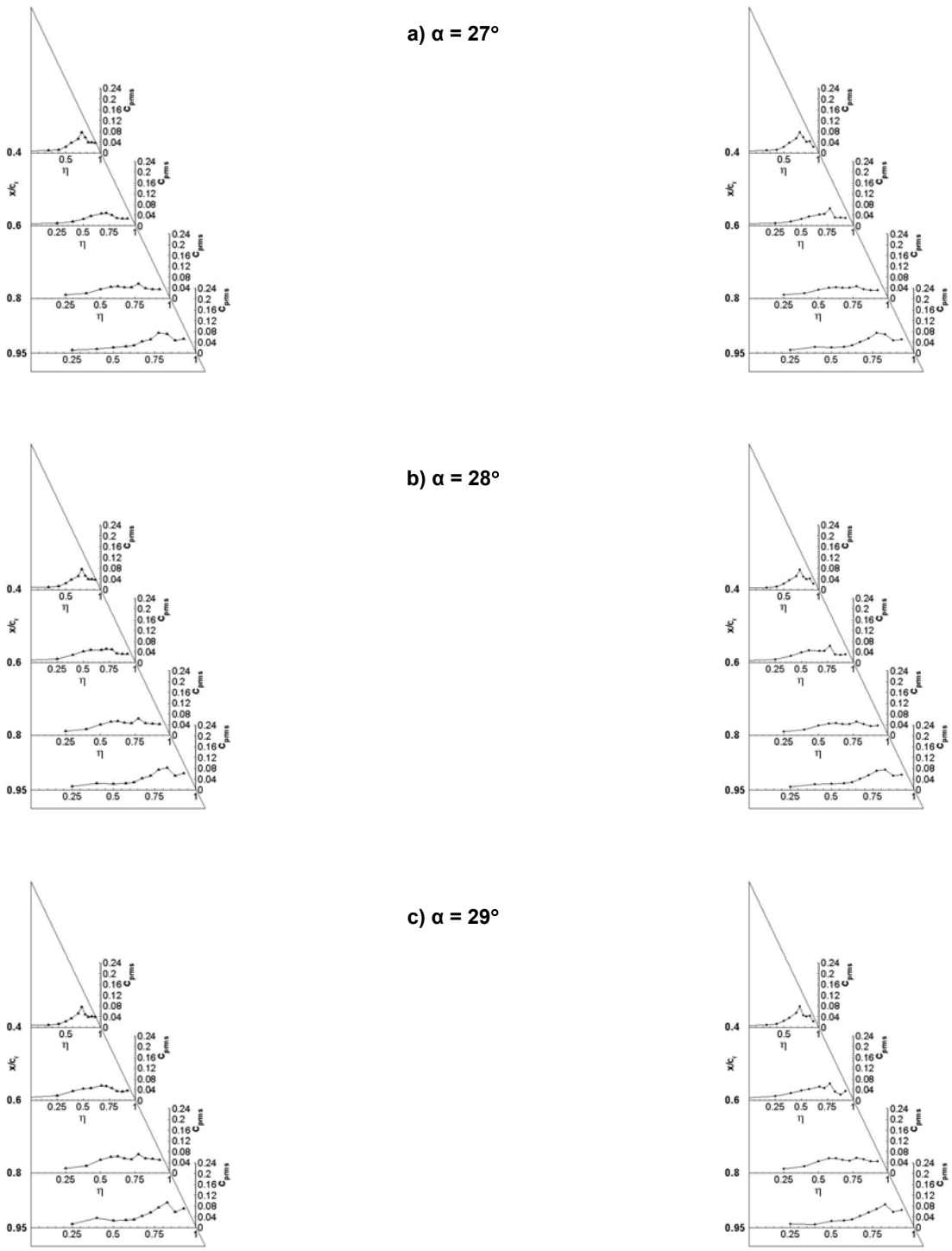


Figure A3.3-30: Pressure Fluctuation Intensity at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 27°, α = 28°, α = 29°.

a) α = 30°

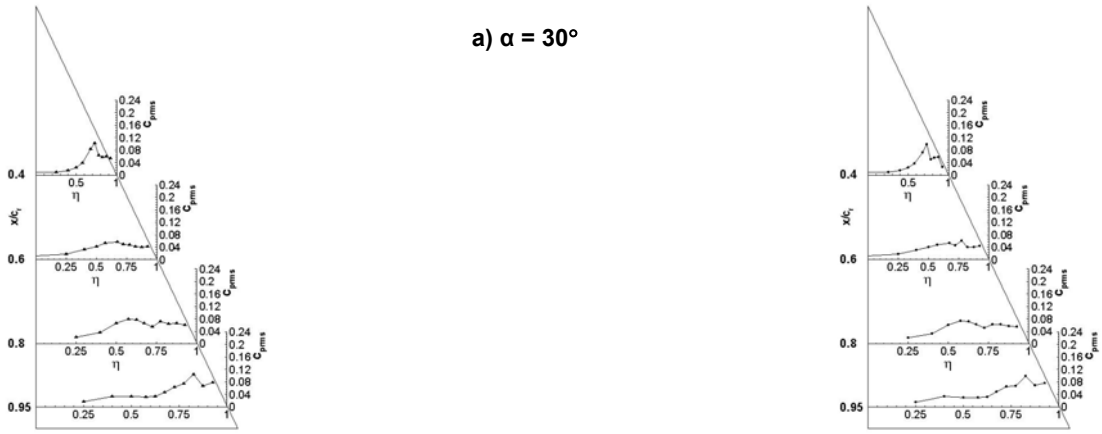


Figure A3.3-31: Pressure Fluctuation Intensity at R_{mac} = 2 x 10^6 and M = 0.14 for Sharp (left) and Rounded (right) Leading Edges – α = 30°.

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