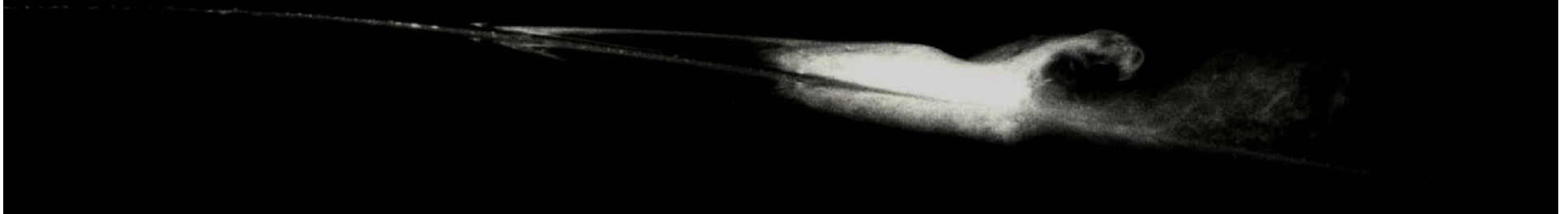


Perfis Aerodinâmicos – Conceitos básicos

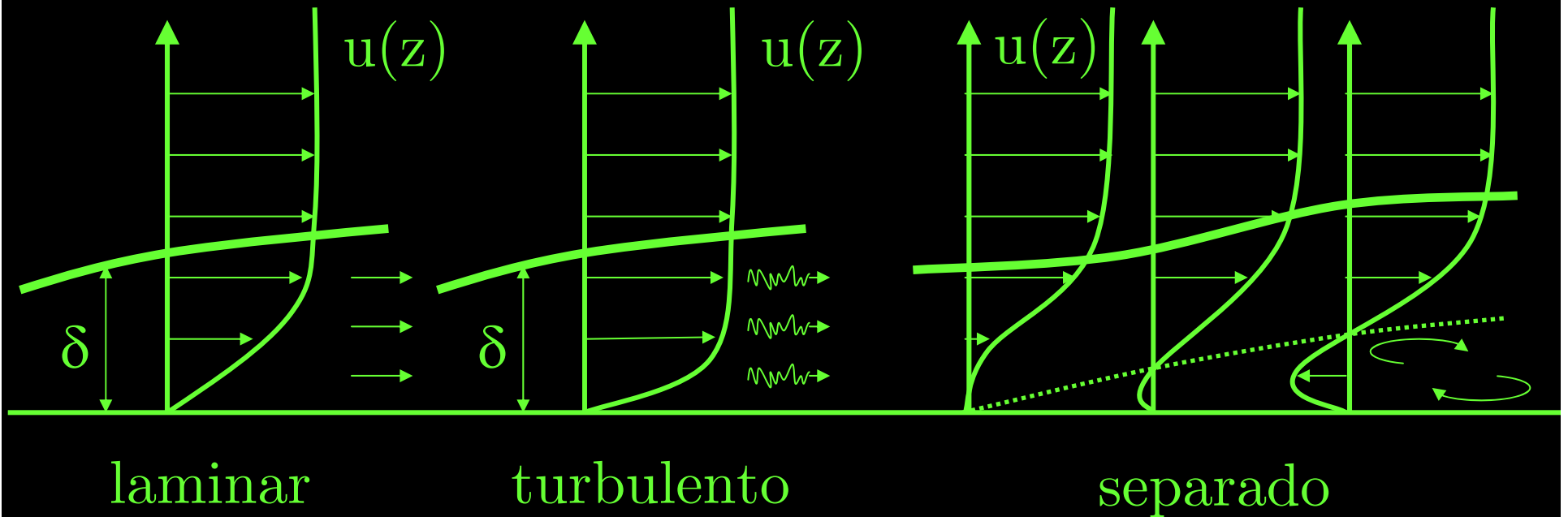
Prof. Paulo Iscold

Centro de Estudos Aeronáuticos - UFMG

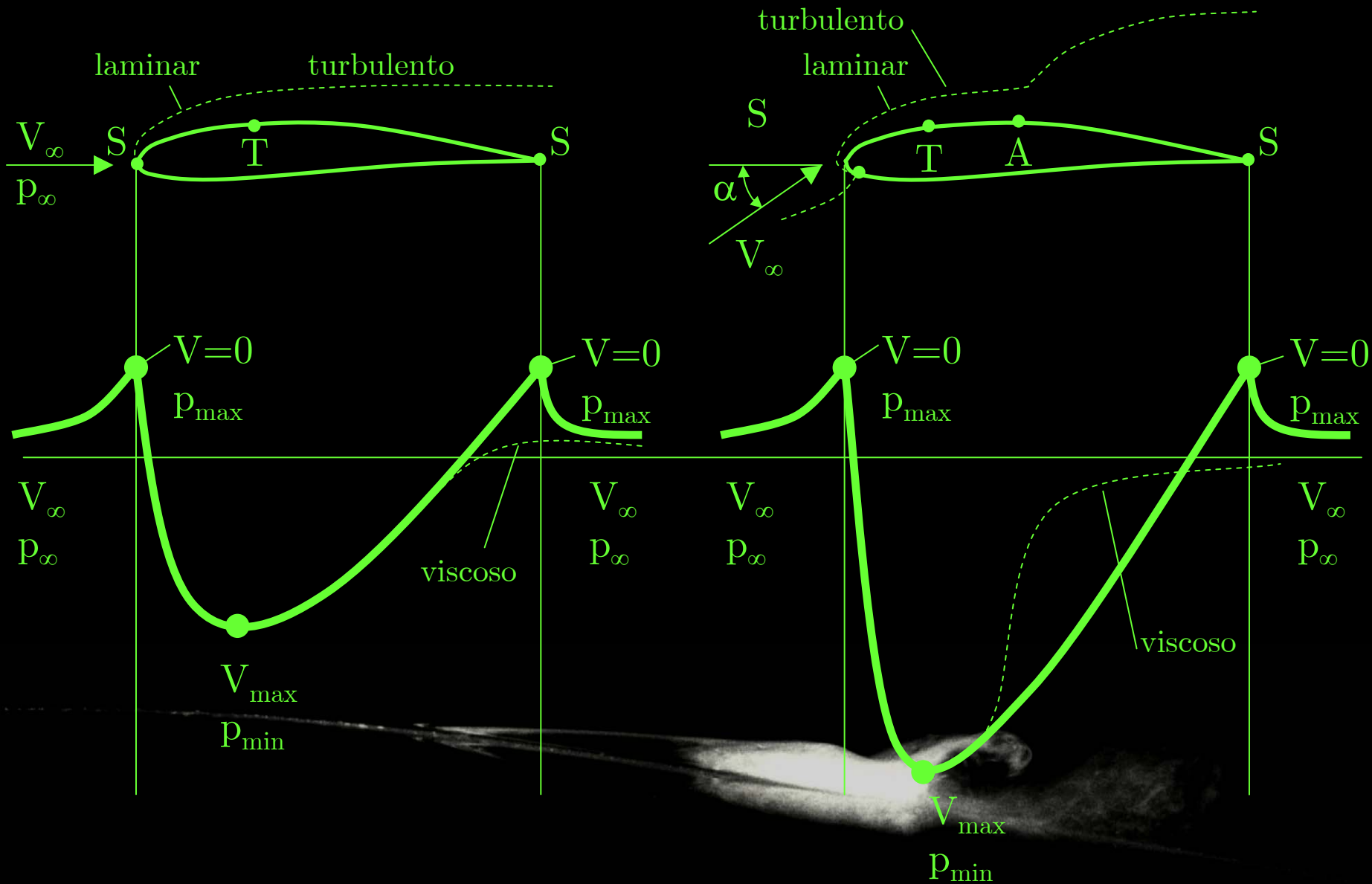
- Camada limite
- Distribuição de pressão
- Transição e separação
- Influência da geometria no desempenho aerodinâmico



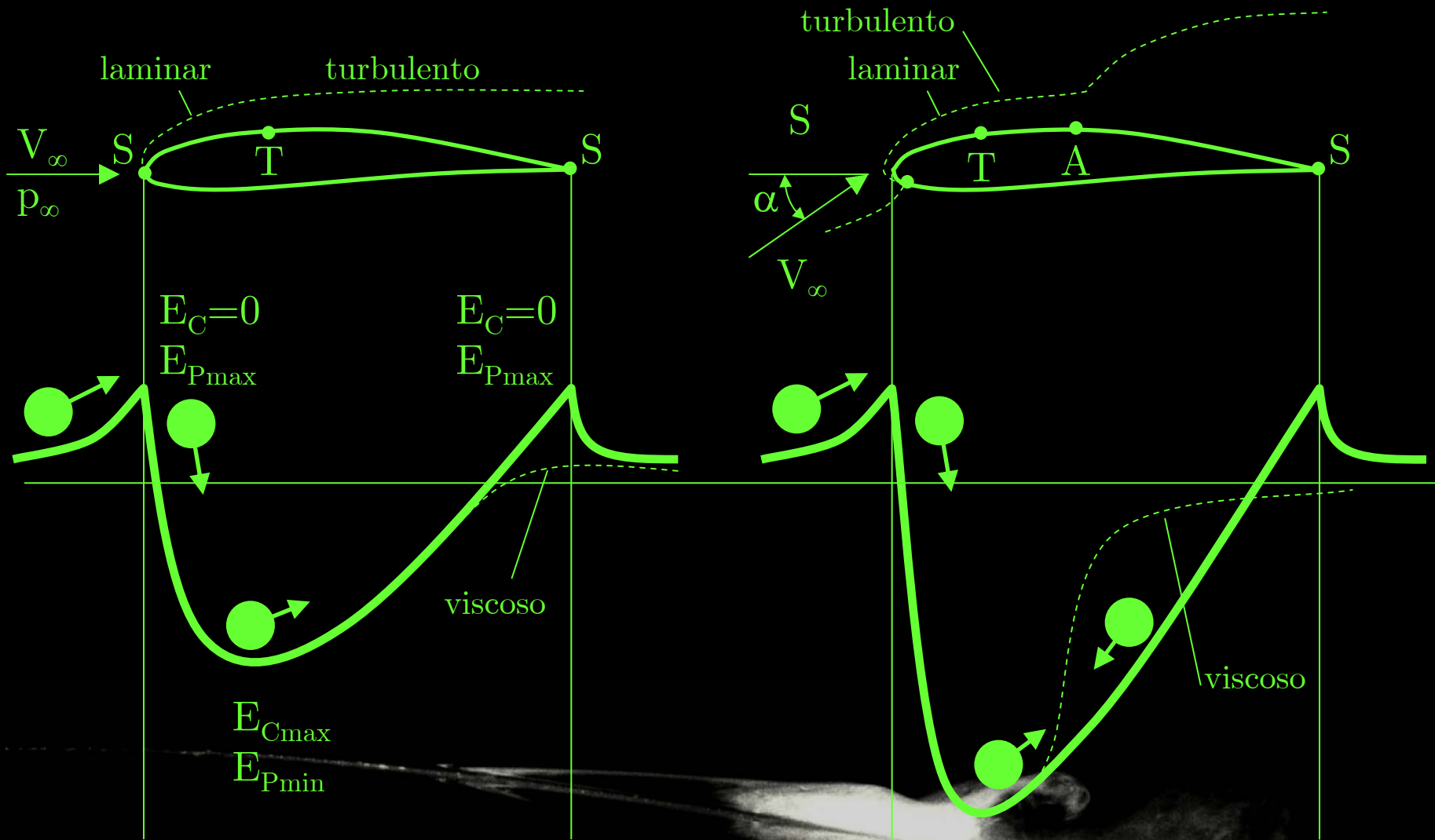
Camada limite



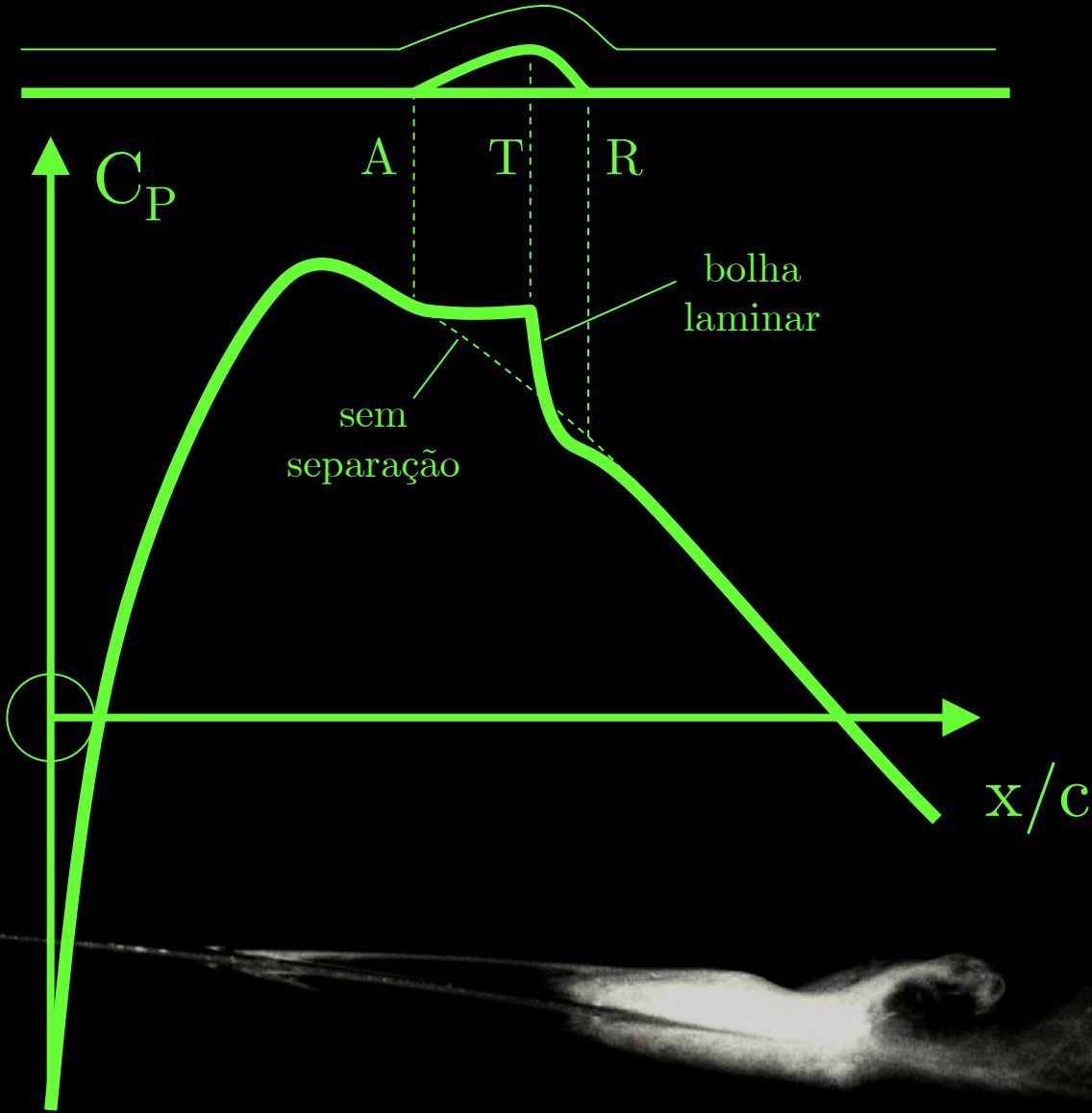
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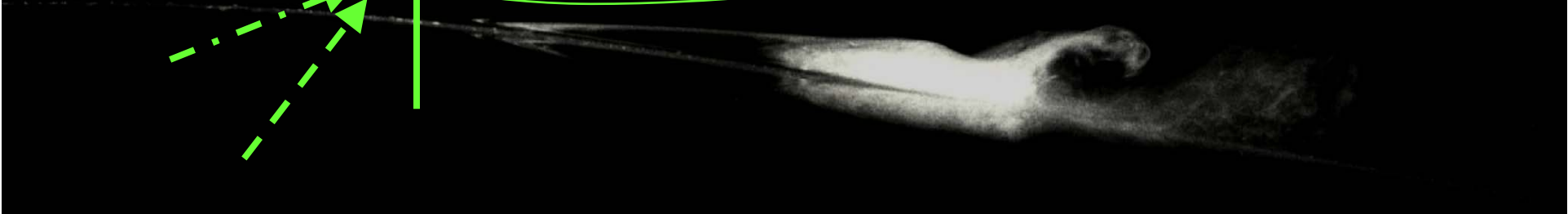
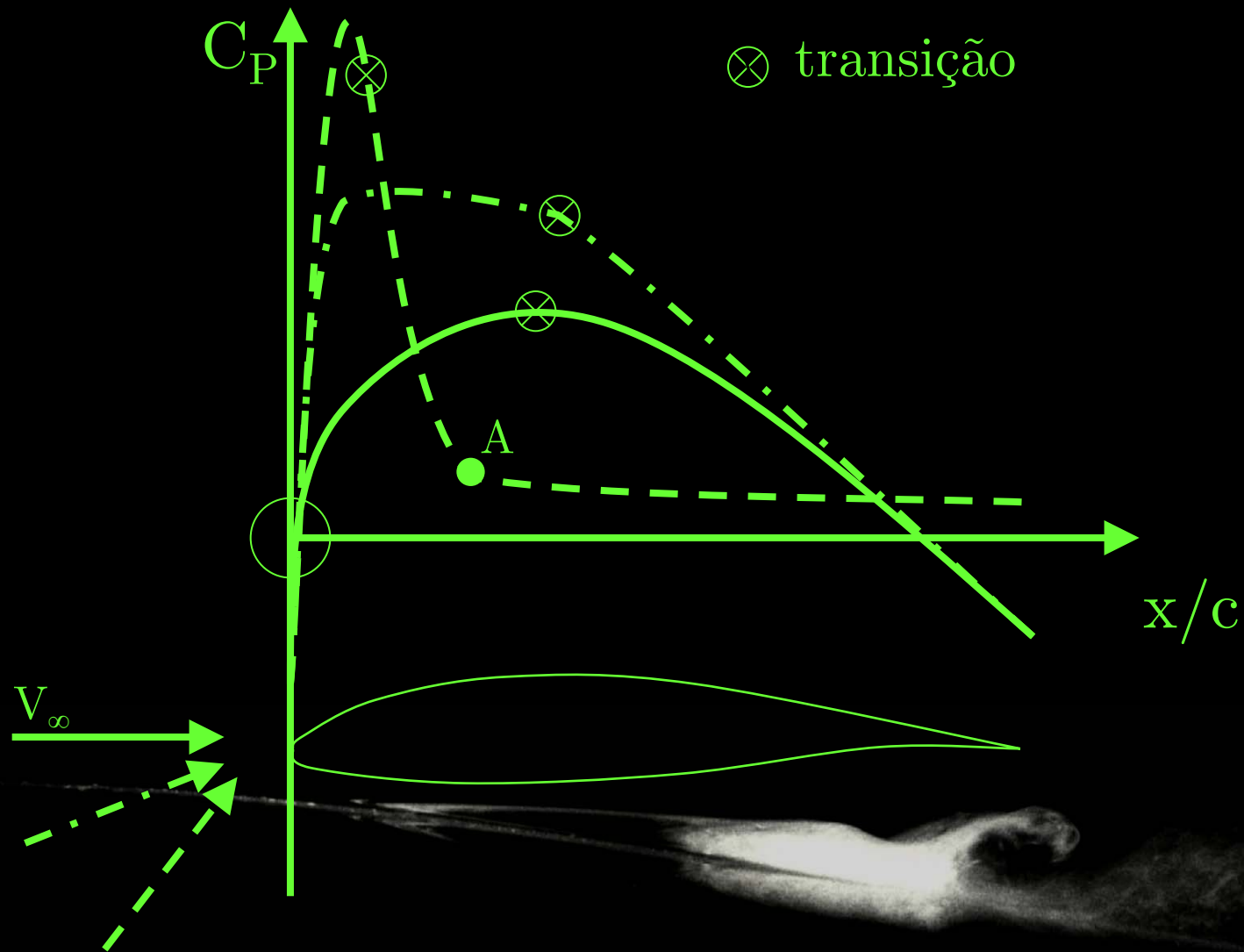
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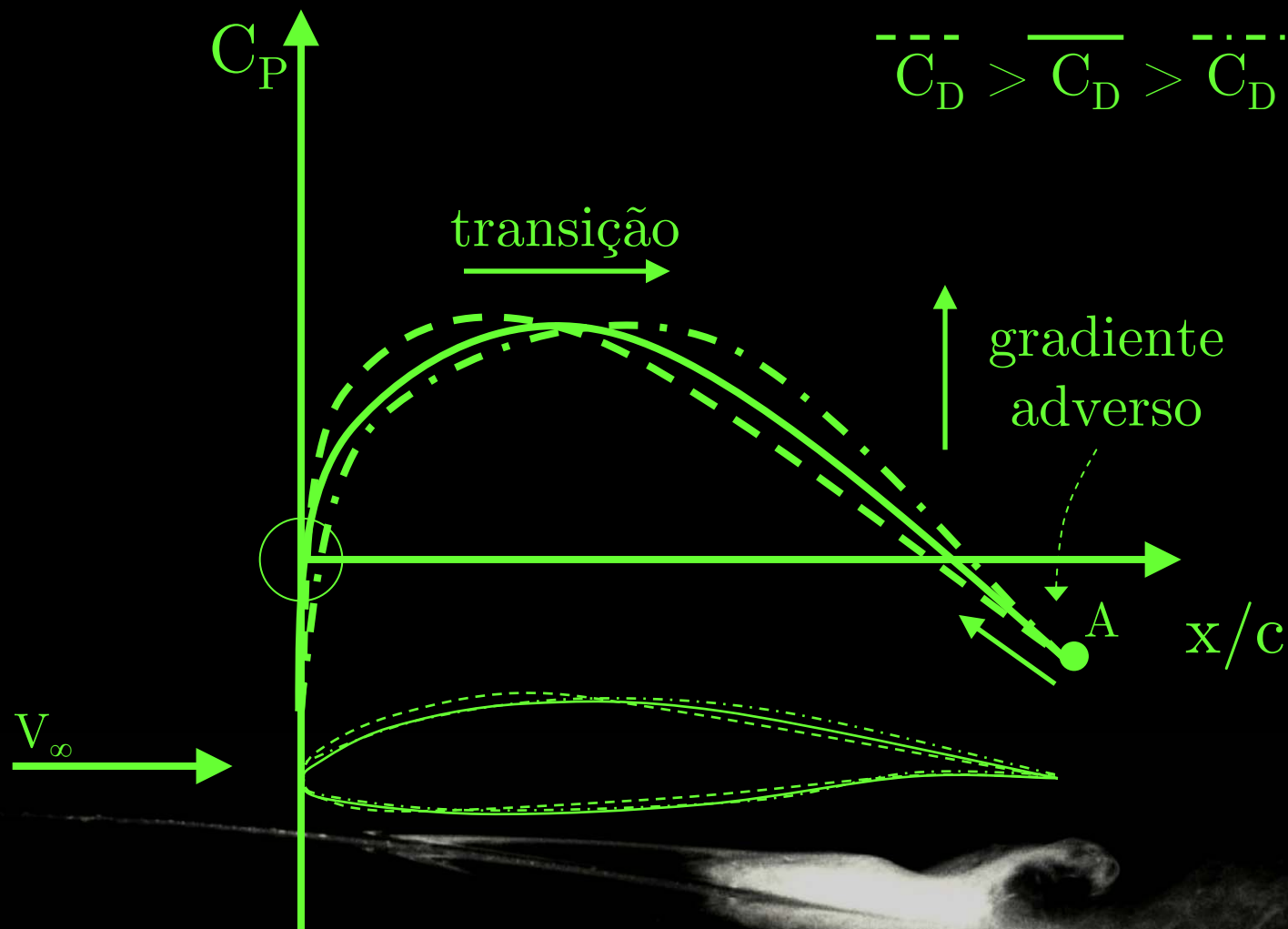
Camada limite



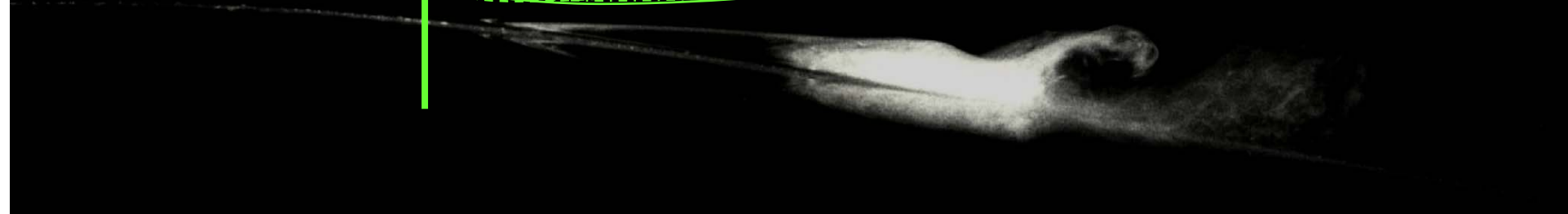
Distribuição de pressão



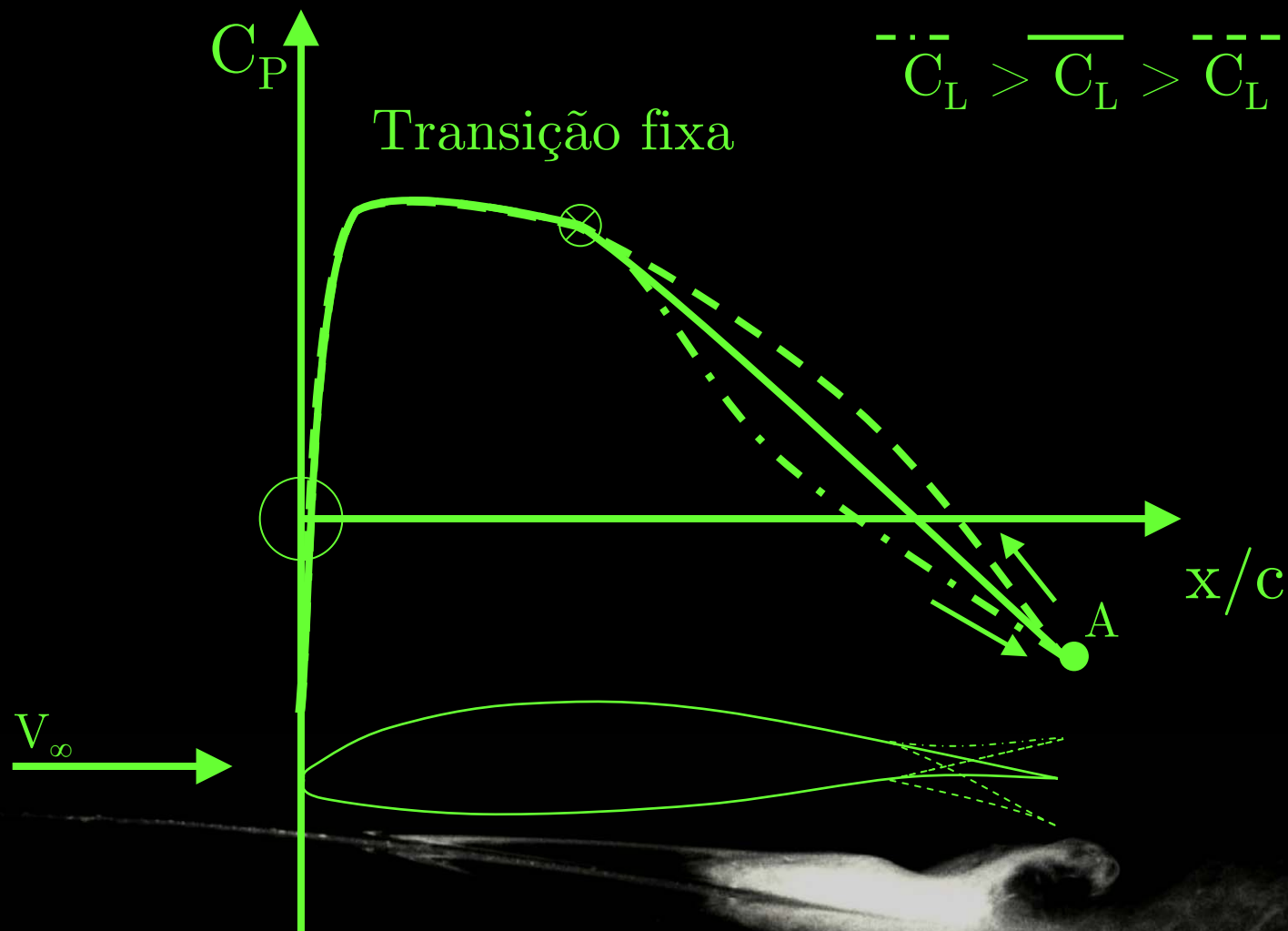
Distribuição de pressão



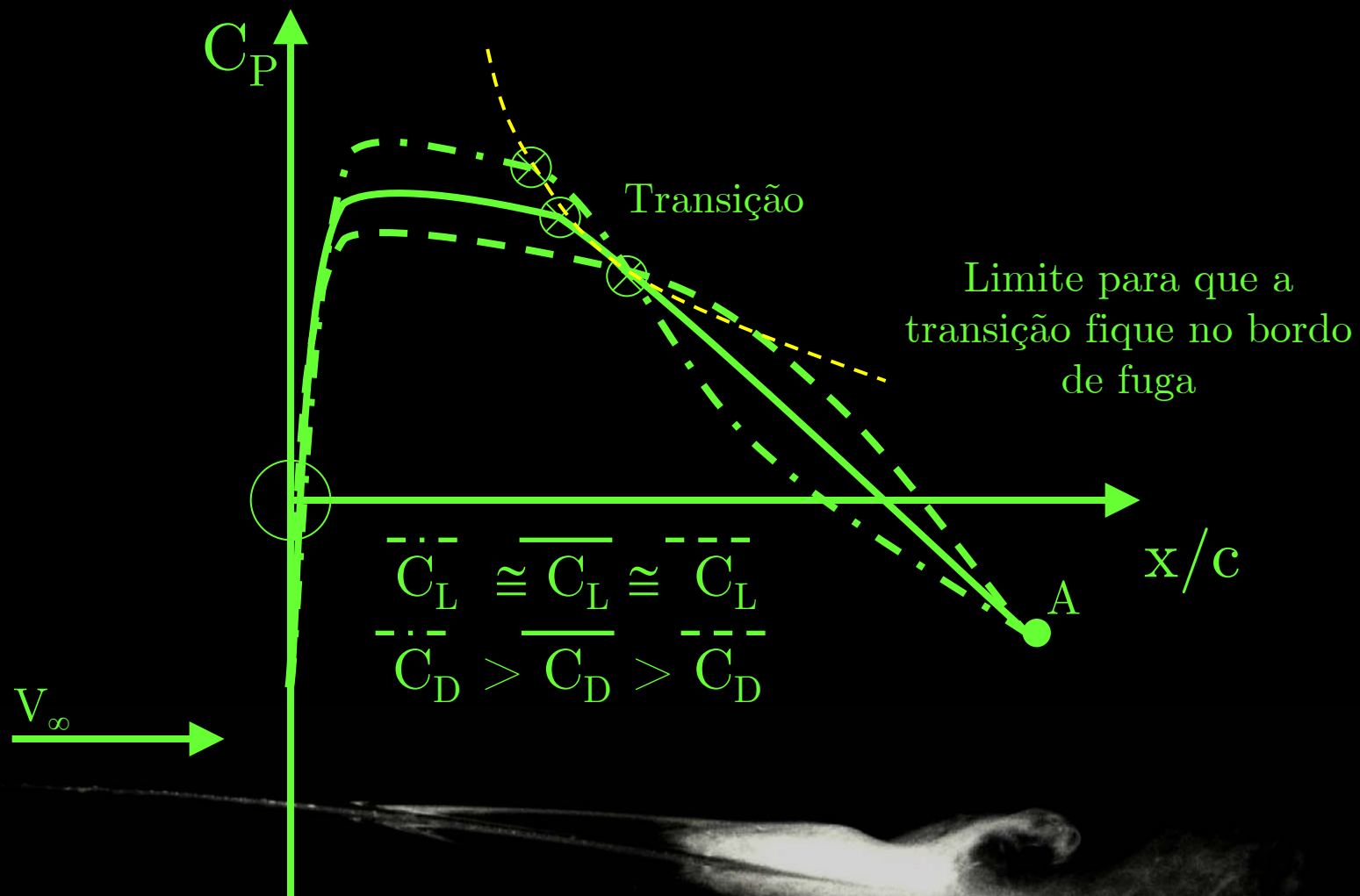
$$\overline{C_D} > \overline{C_D} > \overline{C_D}$$



Distribuição de pressão

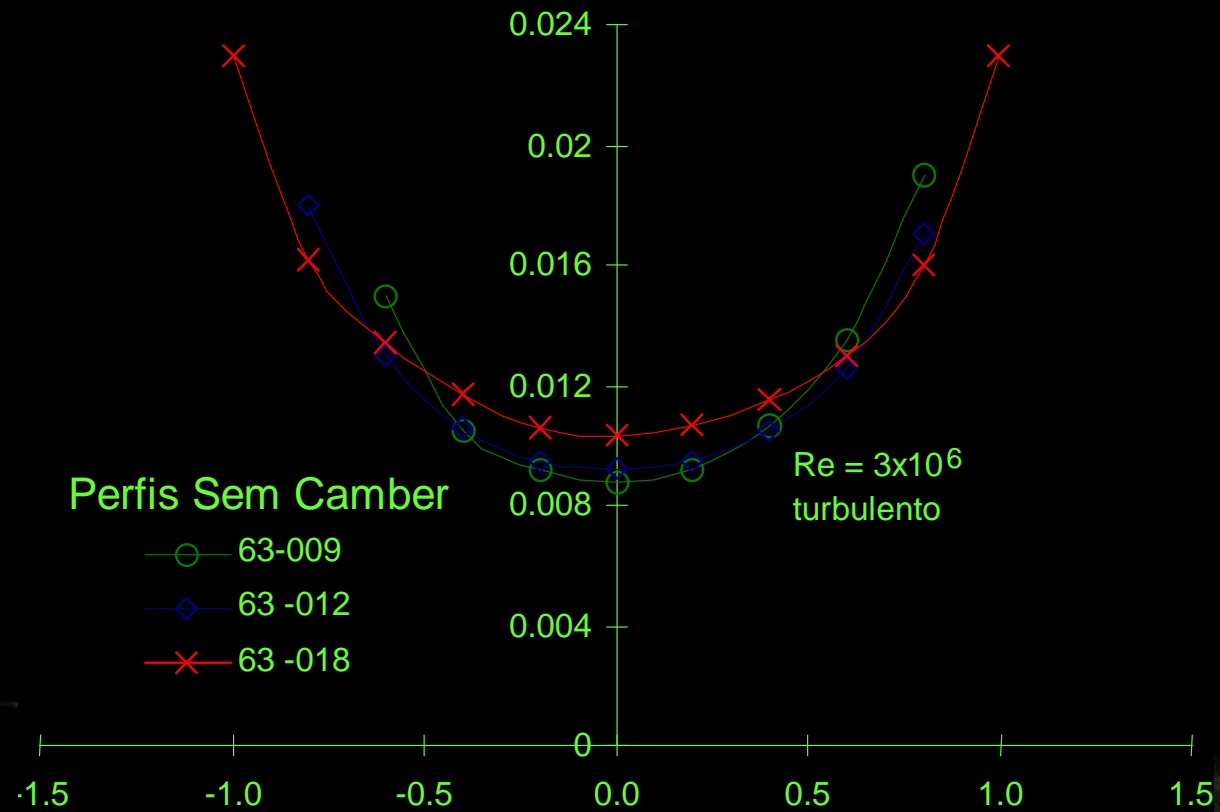


Distribuição de pressão



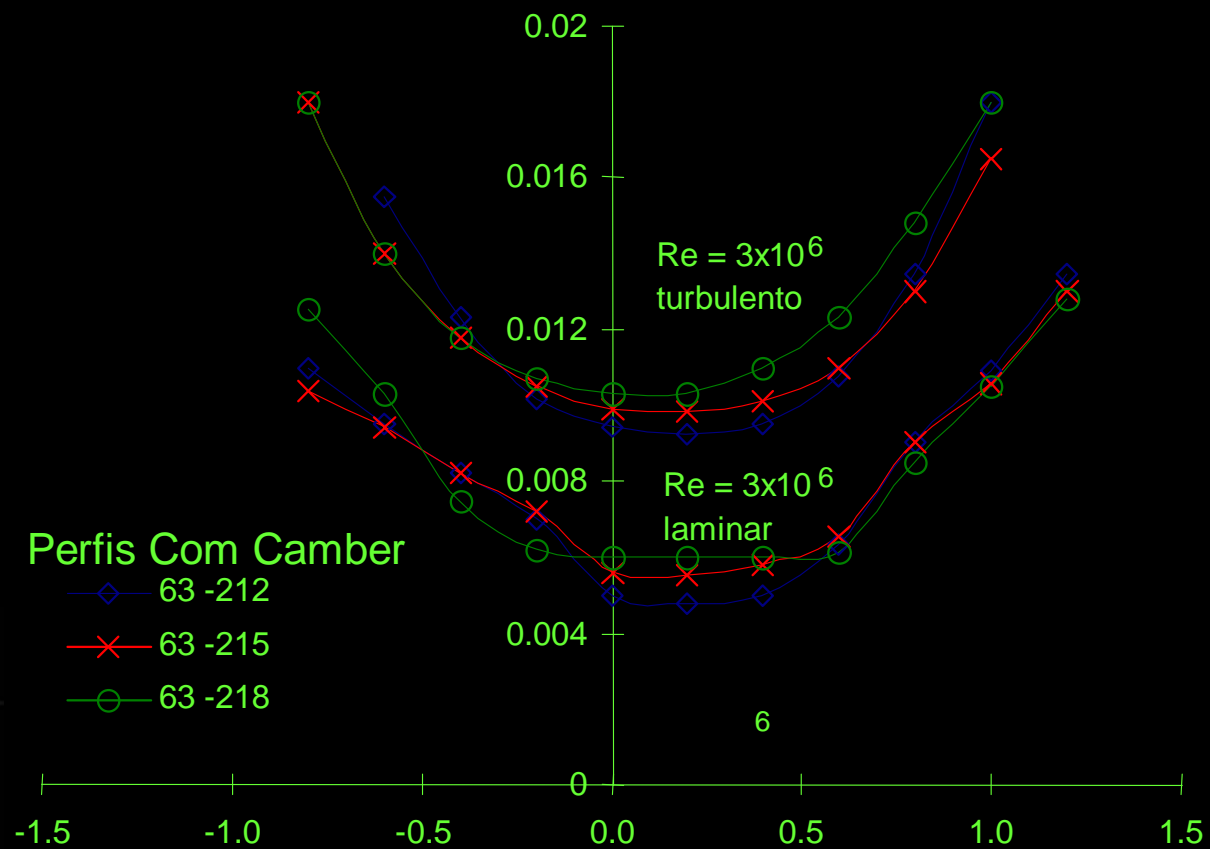
Influência da Geometria

Espessura Relativa



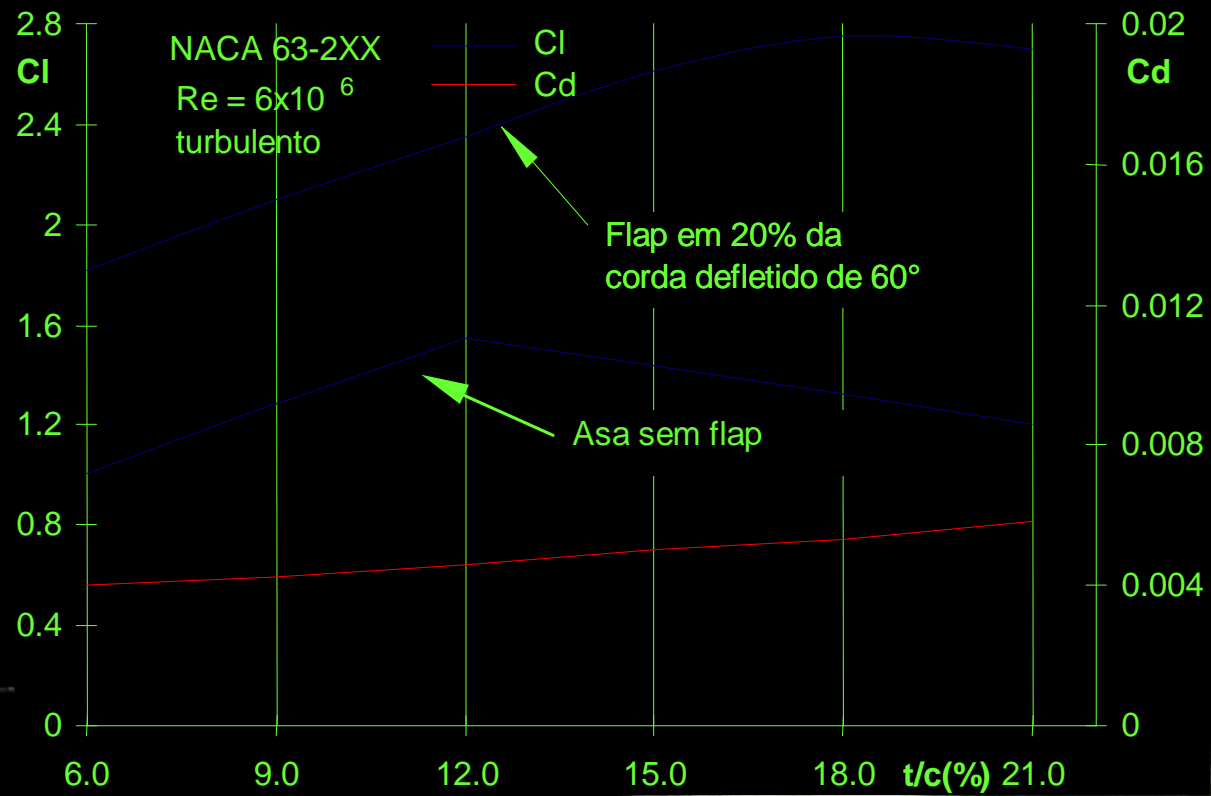
Influência da Geometria

Espessura Relativa



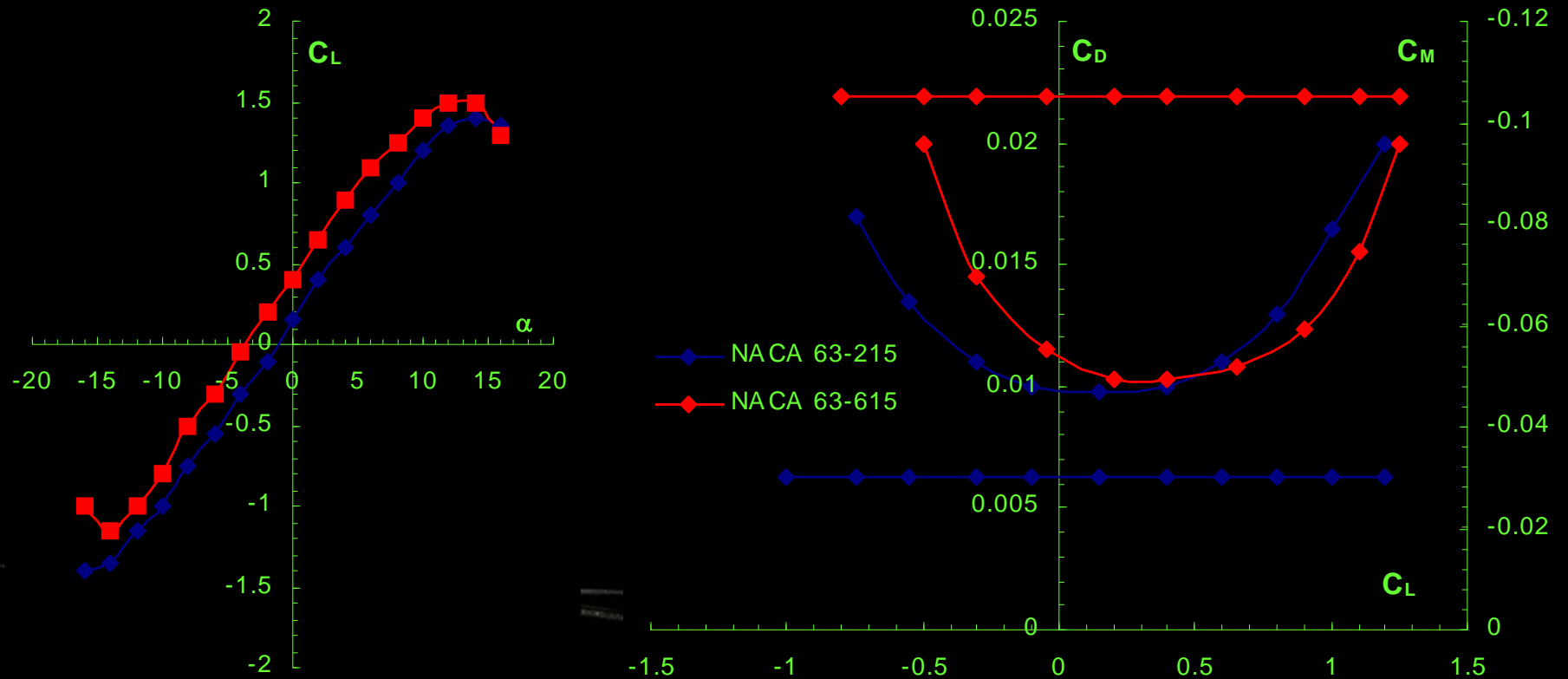
Influência da Geometria

Espessura Relativa



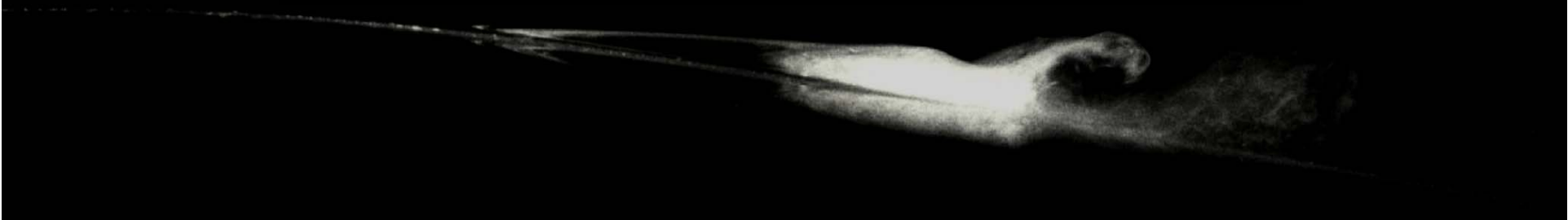
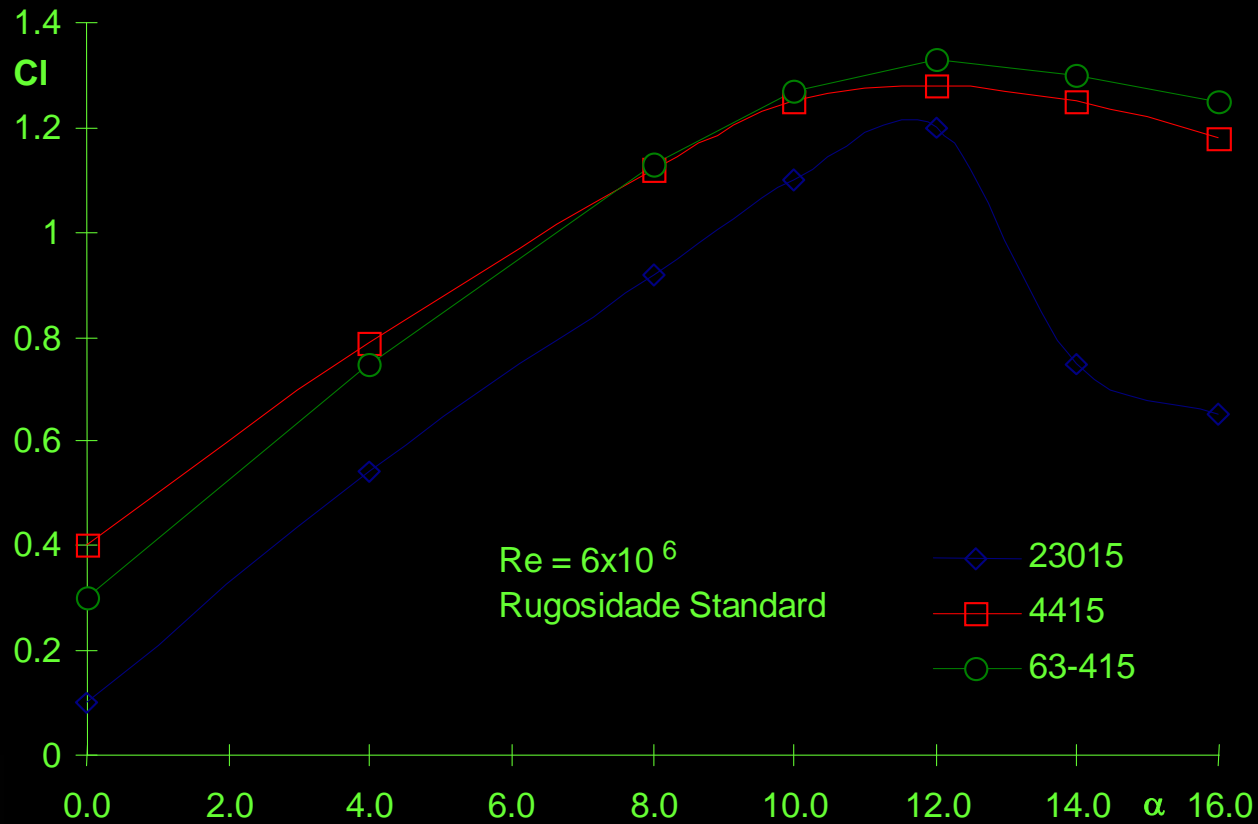
Influência da Geometria

Camber



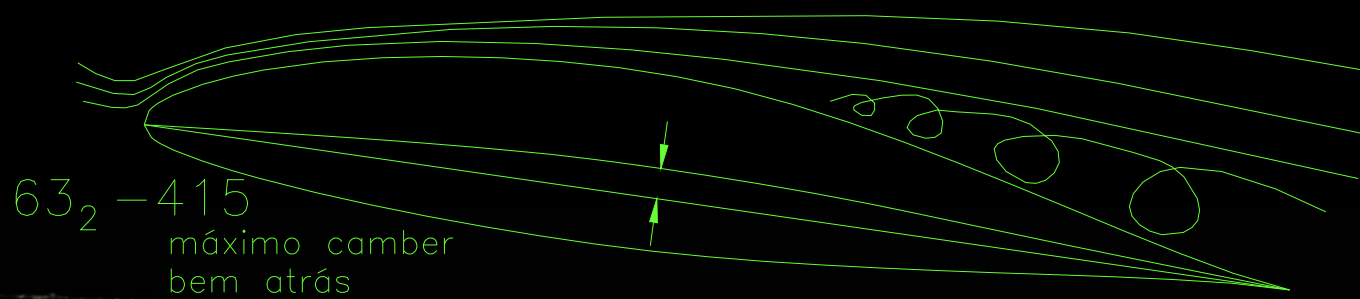
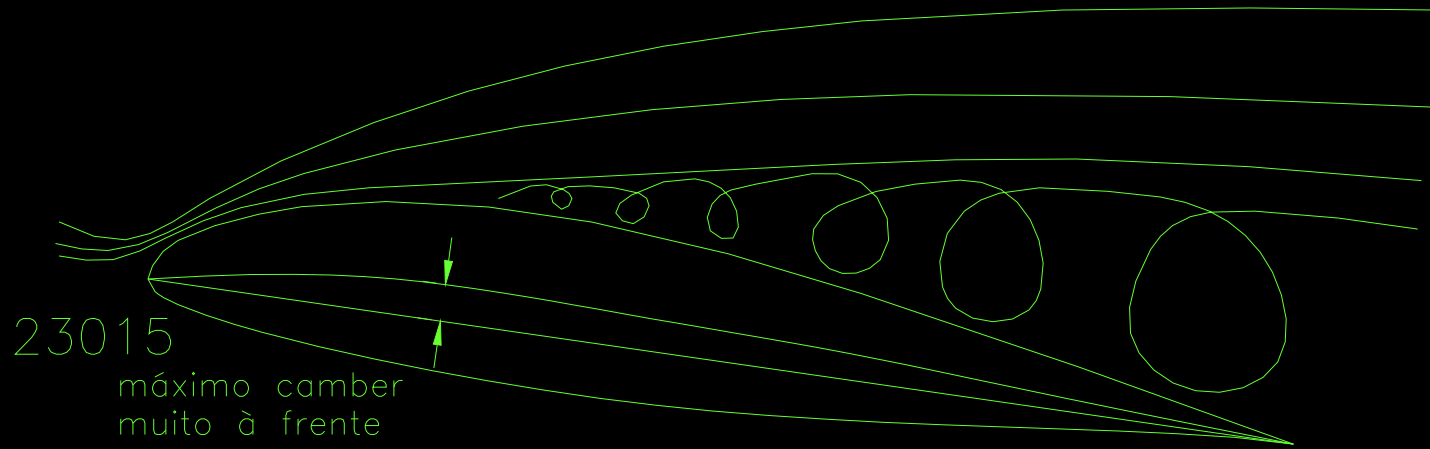
Influência da Geometria

Estol



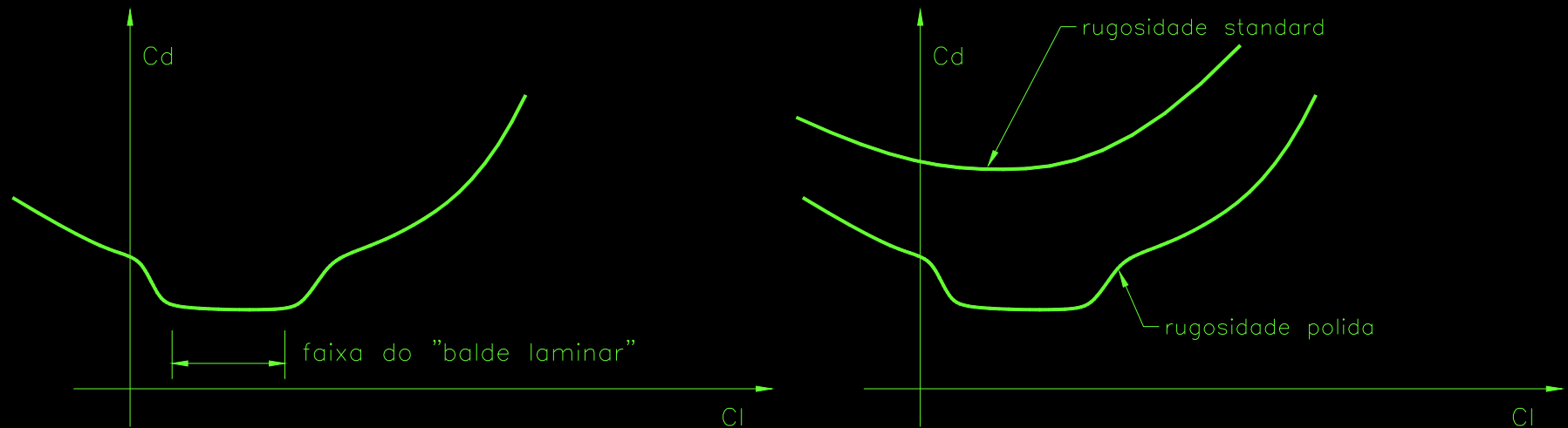
Influência da Geometria

Estol



Influência da Geometria

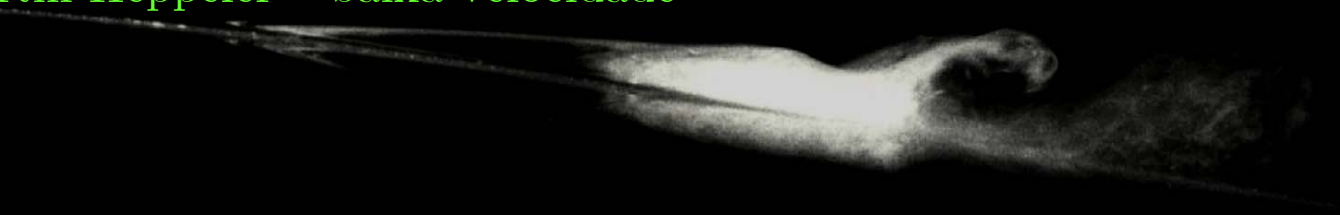
Efeito do acabamento



Influência da Geometria

Famílias

- NACA 4 dígitos
- NACA 5 dígitos
- NACA 6 dígitos – laminares
- NACA 6 dígitos com bordos de ataque mdificados
- NASA GA(W) – General Aviation - Whitcomb
- MS – Wichita State University
- NLF – Natural Laminar Flow
- Wortmann
- HQ
- DU – TU Delft – L.M.M Boermans
- KL – Warsaw University
- S – Selig – baixa velocidade
- MH – Martin Heppeler – baixa velocidade



Influência da Geometria

| Missão | Aeronaves a pistão | Aeronaves a jato | Critério |
|------------------------------|-------------------------|-------------------------|------------|
| Maior alcance | $\frac{C_L}{C_D}$ | $\frac{C_L^{1/2}}{C_D}$ | Maximizado |
| Maior autonomia | $\frac{C_L^{3/2}}{C_D}$ | $\frac{C_L}{C_D}$ | Maximizado |
| Maior velocidade máxima | C_{D_0} | C_{D_0} | Minimizado |
| Menor velocidade mínima | $C_{L \max}$ | $C_{L \max}$ | Maximizado |
| Menor distância de aterragem | $C_{L \max}$ | $C_{L \max}$ | Maximizado |
| Menor distância de decolagem | $\frac{C_L^{3/2}}{C_D}$ | $\frac{C_L^{3/2}}{C_D}$ | Maximizado |
| Maior razão de subida | $\frac{C_L^{3/2}}{C_D}$ | $\frac{C_L^{3/2}}{C_D}$ | Maximizado |
| Menor afundamento mínimo | $\frac{C_L^{3/2}}{C_D}$ | $\frac{C_L^{3/2}}{C_D}$ | Maximizado |