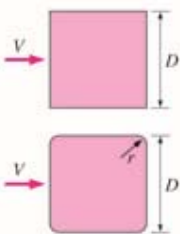
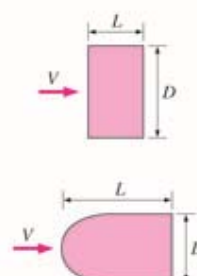
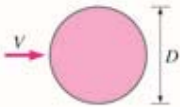
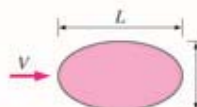
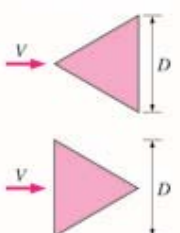
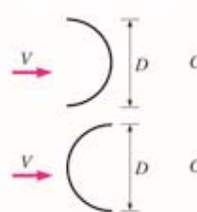
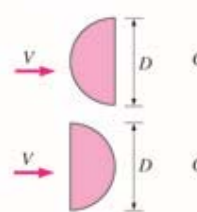



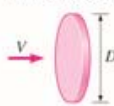


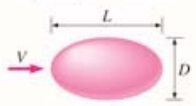
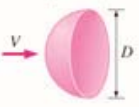

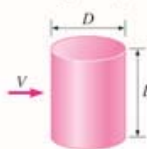


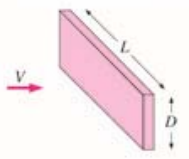

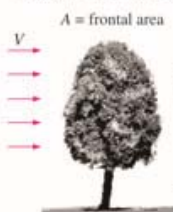
Representative Of Drag Coefficients.

Drag coefficients C_D of various two-dimensional bodies for $Re > 10^4$ based on the frontal area $A = bD$, where b is the length in direction normal to the page (for use in the drag force relation $F_D = C_D A \rho V^2 / 2$ where V is the upstream velocity)

<p>Square rod</p>  <p>Sharp corners: $C_D = 2.2$</p> <p>Round corners ($r/D = 0.2$): $C_D = 1.2$</p>	<p>Rectangular rod</p>  <p>Sharp corners:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>L/D</th> <th>C_D</th> </tr> </thead> <tbody> <tr><td>0.0*</td><td>1.9</td></tr> <tr><td>0.1</td><td>1.9</td></tr> <tr><td>0.5</td><td>2.5</td></tr> <tr><td>1.0</td><td>2.2</td></tr> <tr><td>2.0</td><td>1.7</td></tr> <tr><td>3.0</td><td>1.3</td></tr> </tbody> </table> <p>* Corresponds to thin plate</p> <p>Round front edge:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>L/D</th> <th>C_D</th> </tr> </thead> <tbody> <tr><td>0.5</td><td>1.2</td></tr> <tr><td>1.0</td><td>0.9</td></tr> <tr><td>2.0</td><td>0.7</td></tr> <tr><td>4.0</td><td>0.7</td></tr> </tbody> </table>	L/D	C_D	0.0*	1.9	0.1	1.9	0.5	2.5	1.0	2.2	2.0	1.7	3.0	1.3	L/D	C_D	0.5	1.2	1.0	0.9	2.0	0.7	4.0	0.7	
L/D	C_D																									
0.0*	1.9																									
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<p>Circular rod (cylinder)</p>  <p>Laminar: $C_D = 1.2$</p> <p>Turbulent: $C_D = 0.3$</p>	<p>Elliptical rod</p>  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">L/D</th> <th colspan="2">C_D</th> </tr> <tr> <th>Laminar</th> <th>Turbulent</th> </tr> </thead> <tbody> <tr><td>2</td><td>0.60</td><td>0.20</td></tr> <tr><td>4</td><td>0.35</td><td>0.15</td></tr> <tr><td>8</td><td>0.25</td><td>0.10</td></tr> </tbody> </table>	L/D	C_D		Laminar	Turbulent	2	0.60	0.20	4	0.35	0.15	8	0.25	0.10											
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<p>Equilateral triangular rod</p>  <p>$C_D = 1.5$</p> <p>$C_D = 2.0$</p>	<p>Semicircular shell</p>  <p>$C_D = 2.3$</p> <p>$C_D = 1.2$</p>	<p>Semicircular rod</p>  <p>$C_D = 1.2$</p> <p>$C_D = 1.7$</p>																								

Lampiran 1 – continued

Representative drag coefficients C_D for various three-dimensional bodies based on the frontal area for $Re > 10^4$ unless stated otherwise (for use in the drag force relation $F_D = C_D A \rho V^2 / 2$ where V is the upstream velocity)

<p>Cube, $A = D^2$</p>  <p>$C_D = 1.05$</p>	<p>Thin circular disk, $A = \pi D^2/4$</p>  <p>$C_D = 1.1$</p>	<p>Cone (for $\theta = 30^\circ$), $A = \pi D^2/4$</p>  <p>$C_D = 0.5$</p>																										
<p>Sphere, $A = \pi D^2/4$</p>  <p>Laminar: $Re \leq 2 \times 10^5$ $C_D = 0.5$ Turbulent: $Re \geq 2 \times 10^6$ $C_D = 0.2$</p> <p>See Fig. 11-36 for C_D vs. Re for smooth and rough spheres.</p>	<p>Ellipsoid, $A = \pi D^2/4$</p>  <table border="1" data-bbox="966 630 1242 840"> <thead> <tr> <th rowspan="2">L/D</th> <th colspan="2">C_D</th> </tr> <tr> <th>Laminar $Re \leq 2 \times 10^5$</th> <th>Turbulent $Re \geq 2 \times 10^6$</th> </tr> </thead> <tbody> <tr> <td>0.75</td> <td>0.5</td> <td>0.2</td> </tr> <tr> <td>1</td> <td>0.5</td> <td>0.2</td> </tr> <tr> <td>2</td> <td>0.3</td> <td>0.1</td> </tr> <tr> <td>4</td> <td>0.3</td> <td>0.1</td> </tr> <tr> <td>8</td> <td>0.2</td> <td>0.1</td> </tr> </tbody> </table>		L/D	C_D		Laminar $Re \leq 2 \times 10^5$	Turbulent $Re \geq 2 \times 10^6$	0.75	0.5	0.2	1	0.5	0.2	2	0.3	0.1	4	0.3	0.1	8	0.2	0.1						
L/D	C_D																											
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<p>Hemisphere, $A = \pi D^2/4$</p>  <p>$C_D = 0.4$</p>  <p>$C_D = 1.2$</p>	<p>Finite cylinder, vertical, $A = LD$</p>  <table border="1" data-bbox="779 892 901 1071"> <thead> <tr> <th>L/D</th> <th>C_D</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.6</td> </tr> <tr> <td>2</td> <td>0.7</td> </tr> <tr> <td>5</td> <td>0.8</td> </tr> <tr> <td>10</td> <td>0.9</td> </tr> <tr> <td>40</td> <td>1.0</td> </tr> <tr> <td>∞</td> <td>1.2</td> </tr> </tbody> </table> <p>Values are for laminar flow ($Re \leq 2 \times 10^5$)</p>	L/D	C_D	1	0.6	2	0.7	5	0.8	10	0.9	40	1.0	∞	1.2	<p>Finite cylinder, horizontal, $A = \pi D^2/4$</p>  <table border="1" data-bbox="1128 892 1242 1060"> <thead> <tr> <th>L/D</th> <th>C_D</th> </tr> </thead> <tbody> <tr> <td>0.5</td> <td>1.1</td> </tr> <tr> <td>1</td> <td>0.9</td> </tr> <tr> <td>2</td> <td>0.9</td> </tr> <tr> <td>4</td> <td>0.9</td> </tr> <tr> <td>8</td> <td>1.0</td> </tr> </tbody> </table>	L/D	C_D	0.5	1.1	1	0.9	2	0.9	4	0.9	8	1.0
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<p>Streamlined body, $A = \pi D^2/4$</p>  <p>$C_D = 0.04$</p> <p>Rectangular plate, $A = LD$</p>  <p>$C_D = 1.10 + 0.02 (L/D + D/L)$ for $1/30 < (L/D) < 30$</p>	<p>Parachute, $A = \pi D^2/4$</p>  <p>$C_D = 1.3$</p>	<p>Tree, $A =$ frontal area</p>  <table border="1" data-bbox="1096 1228 1242 1354"> <thead> <tr> <th>$V, \text{ m/s}$</th> <th>C_D</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>0.4–1.2</td> </tr> <tr> <td>20</td> <td>0.3–1.0</td> </tr> <tr> <td>30</td> <td>0.2–0.7</td> </tr> </tbody> </table>	$V, \text{ m/s}$	C_D	10	0.4–1.2	20	0.3–1.0	30	0.2–0.7																		
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