

APPENDIX A: CARTESIAN TENSORS

# Turbulent Flows

Stephen B. Pope

*Cambridge University Press, 2000*

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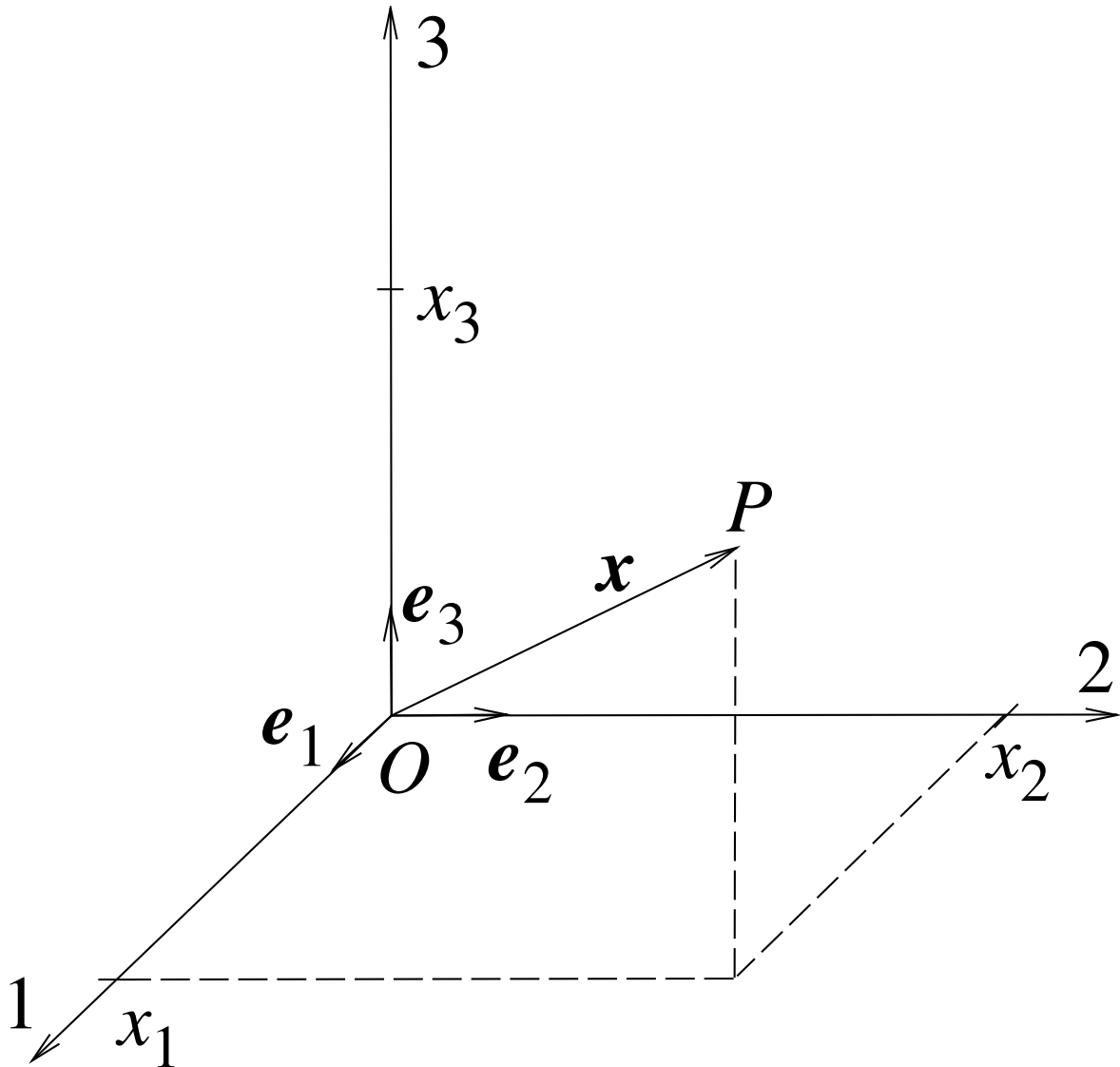


Figure A.1: A sketch of the  $E$  coordinate system showing the origin  $O$ , the three orthonormal basis vectors,  $\mathbf{e}_i$ , and the general point  $P$  with position  $\mathbf{x} = x_1\mathbf{e}_1 + x_2\mathbf{e}_2 + x_3\mathbf{e}_3$ .

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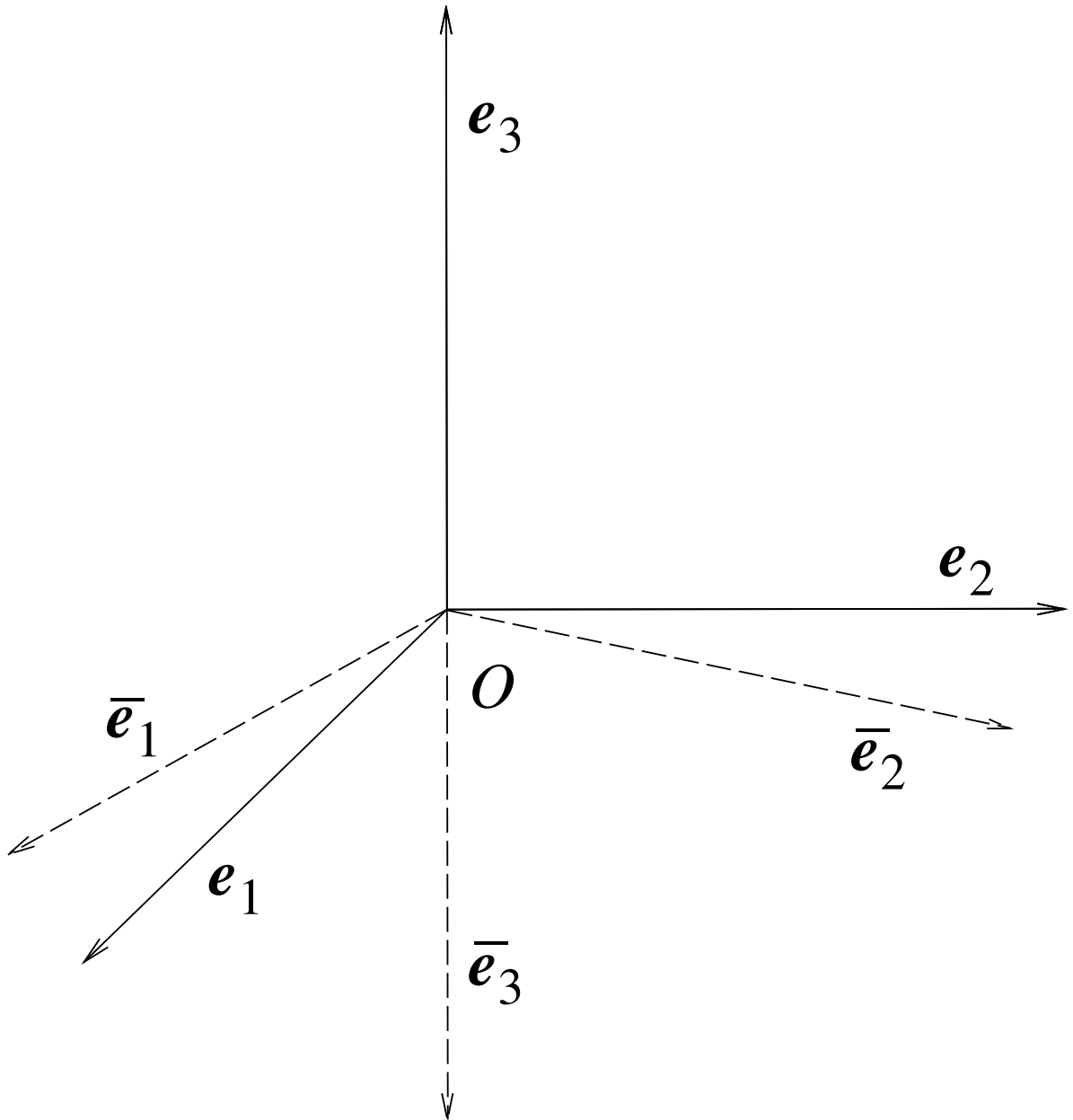


Figure A.2: A sketch of the  $E$  (solid lines) and  $\bar{E}$  (dashed lines) coordinate systems. In this particular example,  $\bar{E}$  is obtained from  $E$  by a reflection of the  $\bar{\mathbf{e}}_3$  axis, and a rotation in the  $\mathbf{e}_1$ - $\mathbf{e}_2$  plane.

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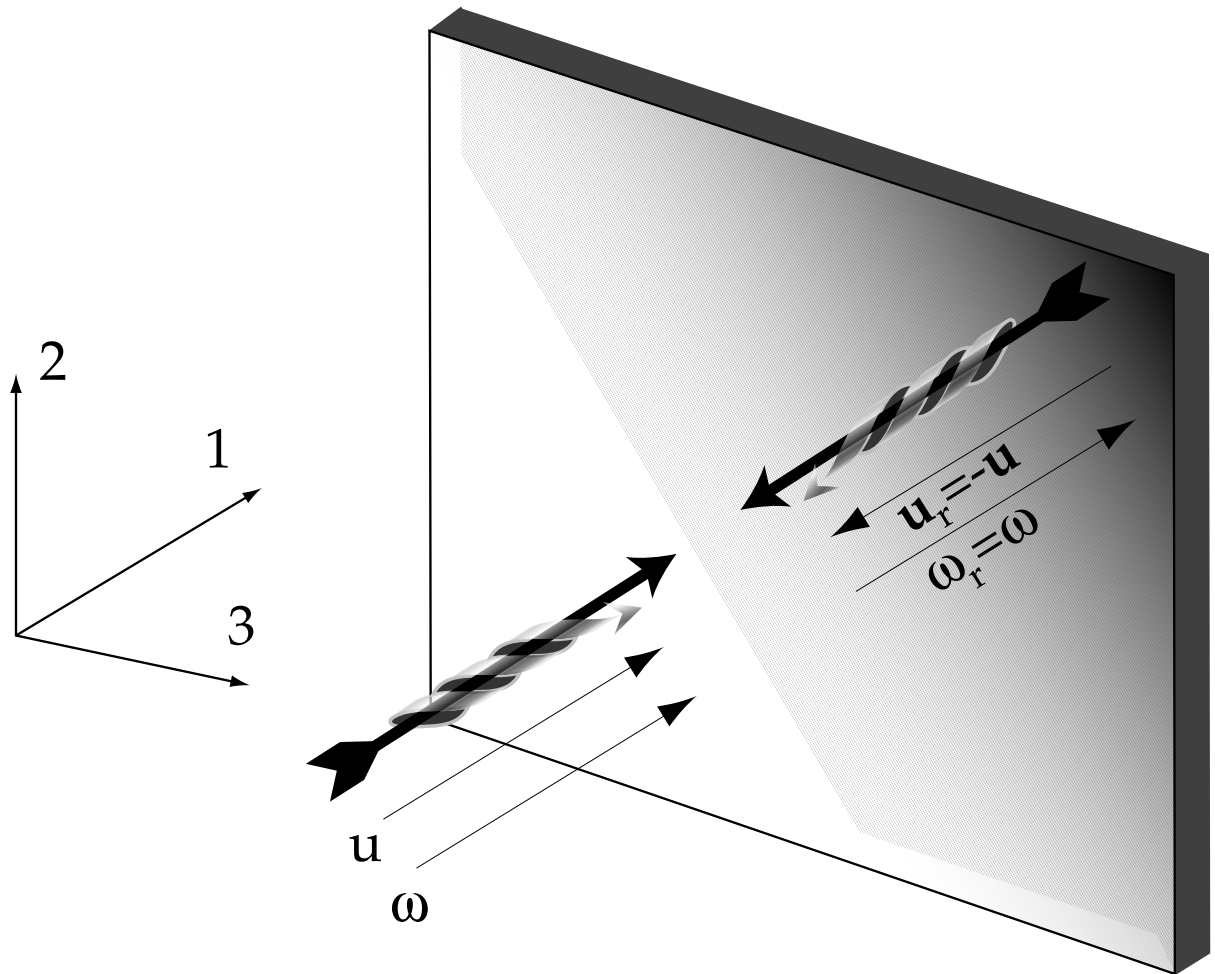


Figure A.3: A sketch in a right-handed coordinate system of a spinning arrow (bottom left) moving toward a mirror, and its image in the mirror (top right). The velocity vector  $\mathbf{u}$  changes direction but the rotation pseudo-vector  $\boldsymbol{\omega}$  does not.

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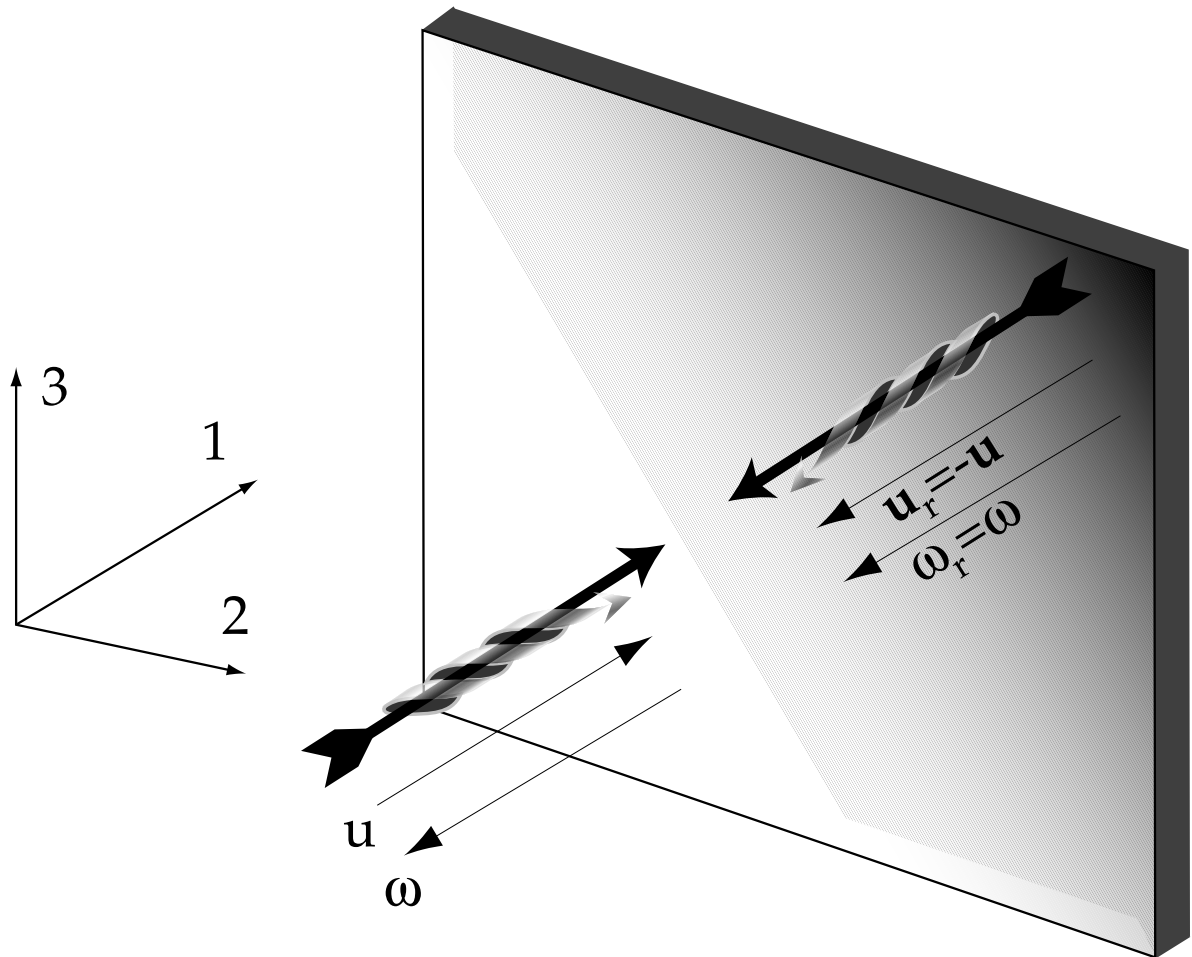


Figure A.4: A sketch in a left-handed coordinate system of the same spinning arrow and mirror as depicted in Fig. A.3. Note the direction of the rotation pseudo-vector  $\boldsymbol{\omega}$ .

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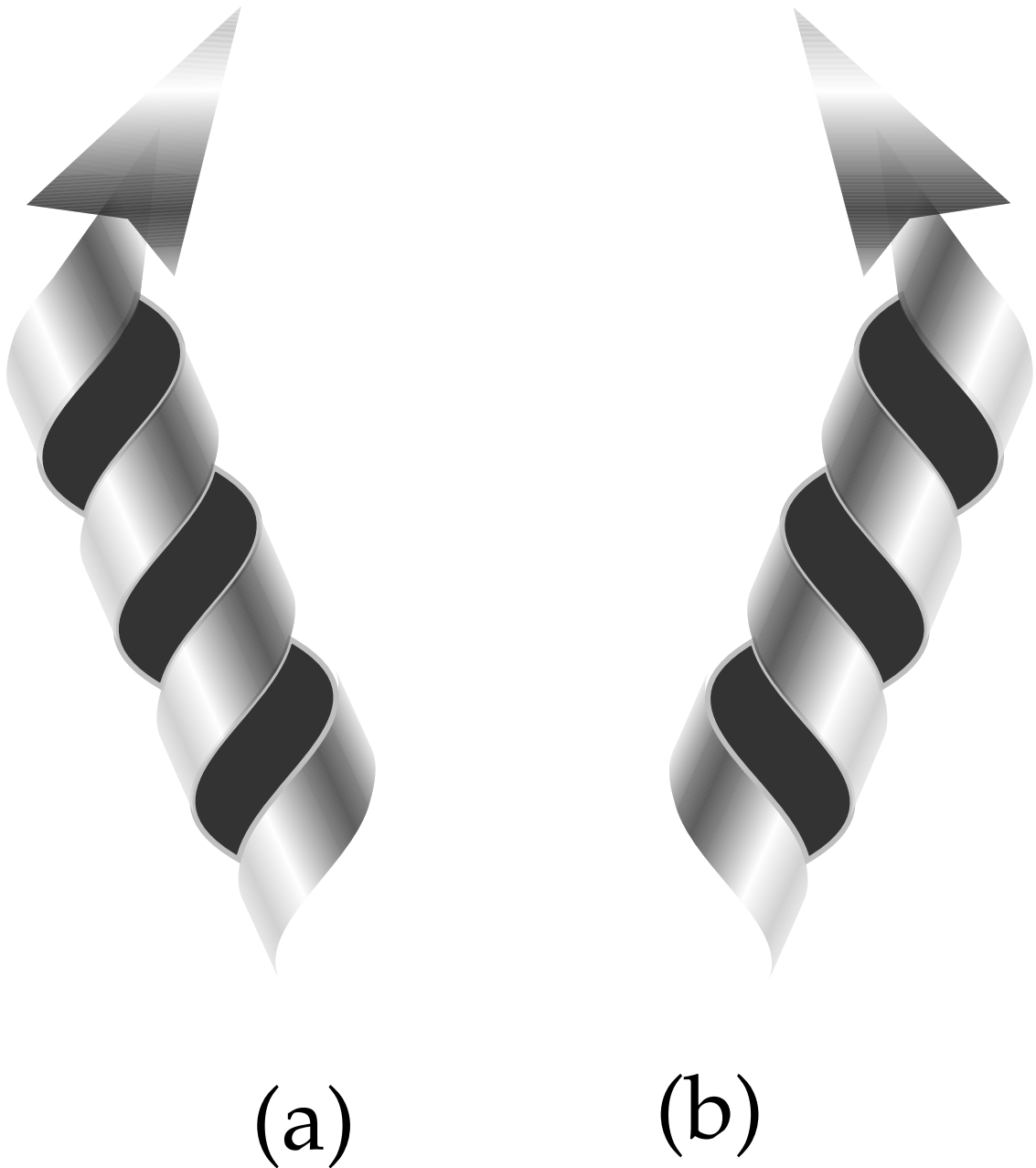


Figure A.5: Sketches of helical motion (a) with positive helicity ( $\mathbf{u} \cdot \boldsymbol{\omega} > 0$ ) and (b) with negative helicity ( $\mathbf{u} \cdot \boldsymbol{\omega} < 0$ ).