|  |  |  |
| --- | --- | --- |
|  | [**DOING PHYSICS WITH MATLAB**](http://www.physics.usyd.edu.au/teach_res/mp/mphome.htm)  **MECHANICS**  **ELECTRIC MOTOR ANIMATION**    Ian Cooper  School of Physics, University of Sydney  ian.cooper@sydney.edu.au  [**DOWNLOAD DIRECTORY FOR MATLAB SCRIPTS**](http://www.physics.usyd.edu.au/teach_res/mp/mscripts)    **em\_motor\_1.m**  Matlab used as a drawing package to create an animated gif of the motion of a coil in a magnetic field.    **ELECTRIC MOTOR SIMULATION**  An electric motor is an electromechanical device that converts electrical energy into mechanical energy.  When a current flows through the armature (coil windings) in the magnet field it will experience a torque. However, the coil can only rotate continually in one direction if the direction of the current is reversed for each half turn of the coil to keep the direction of the toque on the current loop constant.  The basic components of the of a DC motor are show in figure (1).    Fig. 1. The basic parts of a DC motor.  The motion of the coil **ABCD** in the magnetic field is animated in figure (2). Itshows the view of the coil looking along the +y direction (into screen). Only the sides **AB** and **CD** experience a torque that causes the rotation of the coil. The magnitude of this torque changes as the coil rotates since the angle between the directions of the magnetic field and the plane of the coil continually changes. The current in arm **AB** is shown and how its direction is reversed each half cycle so that the direction of the torque is constant. The direction of the magnetic force on a current element is at right angles to the directions for the magnetic field and the current. The directions can be determined by the **right hand palm rule**.    Fig. 2. Animation of a DC motor: rotation of the armature – variations in current and torque. |  |