

Graphical Linkage Synthesis

- Types of Kinematic Synthesis
- Limiting Conditions
 - Toggle Positions
 - Transmission Angle
- Two-Position Synthesis for Rocker Output

Synthesis

□ Qualitative

- Creation of potential solutions in the absence of a well defined algorithm that configures or predicts the solution
- Type
 - The proper type of mechanism best suited to the problem

□ Quantitative

- Defined Synthesis Algorithm
- Analytical
- Dimensional

Types of Kinematic Synthesis for Planar Mechanisms

□ Function Generation

- The correlation of an **input function** with an **output function** in a mechanism

□ Path Generation

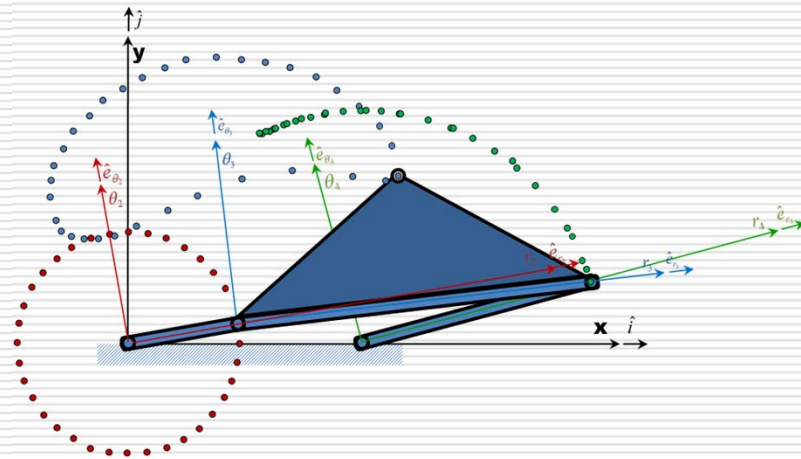
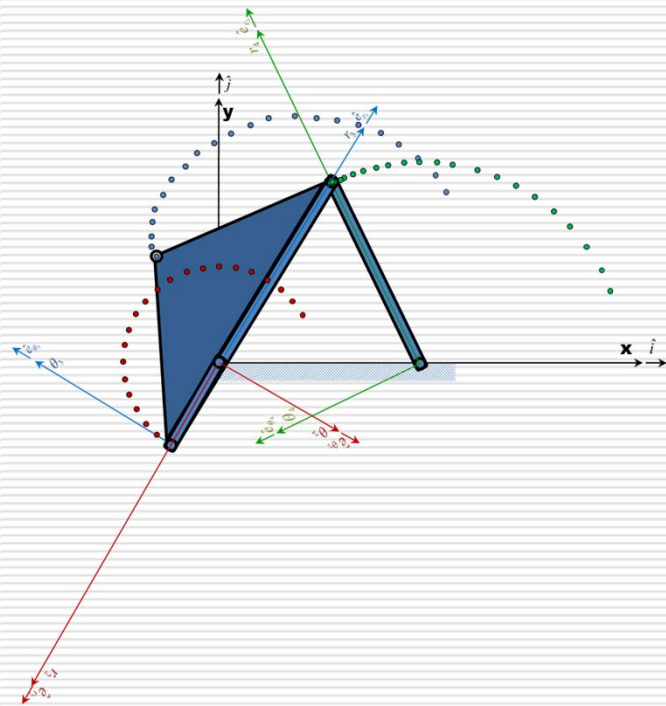
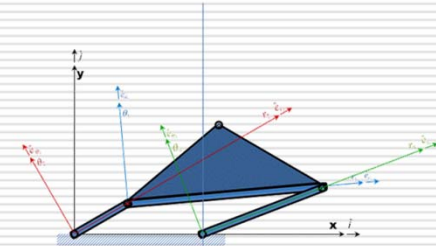
- The control of a **point** in the plane such that it follows some prescribed path.

□ Motion Generation

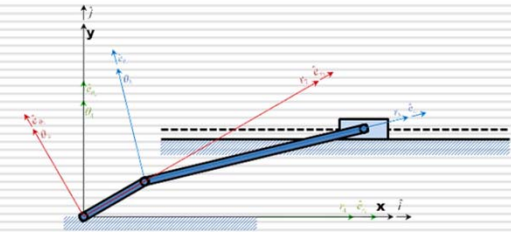
- The control of a **line** in the plane such that it assumes some sequential set of prescribed positions

Limiting Conditions: TOGGLE POSITION

- Determined by the **COLINEARITY** of the moving links

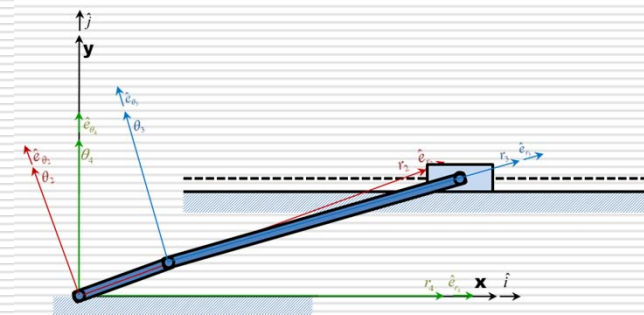
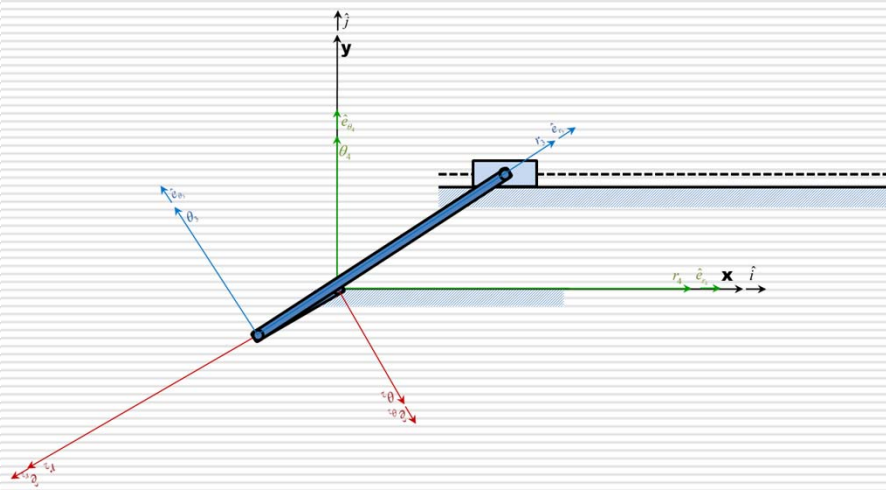


Limiting Conditions: TOGGLE POSITION

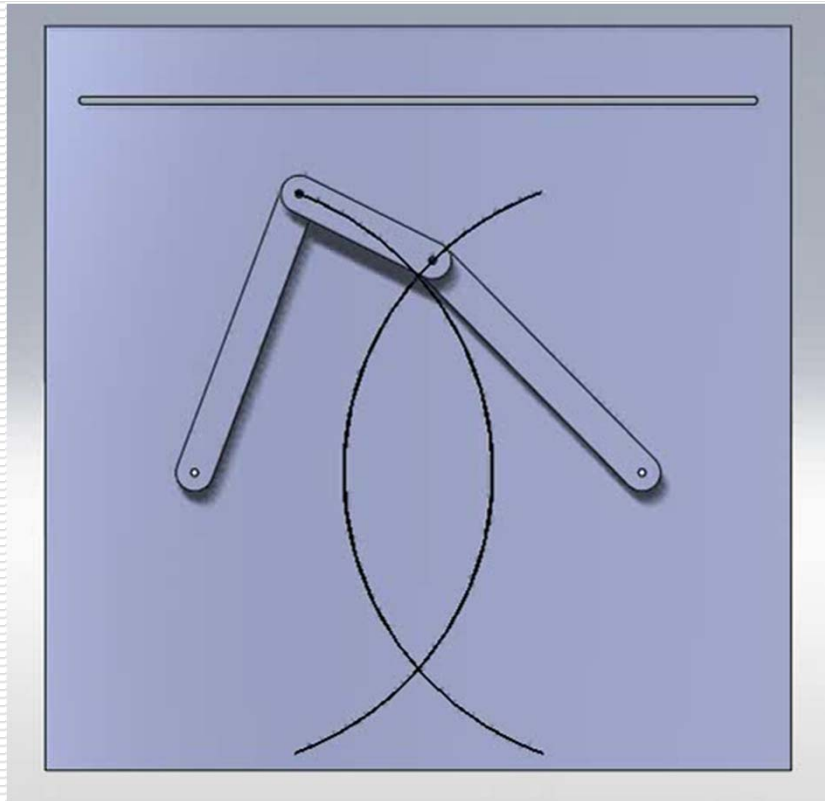


□ Determined by the **COLINEARITY** of the moving links

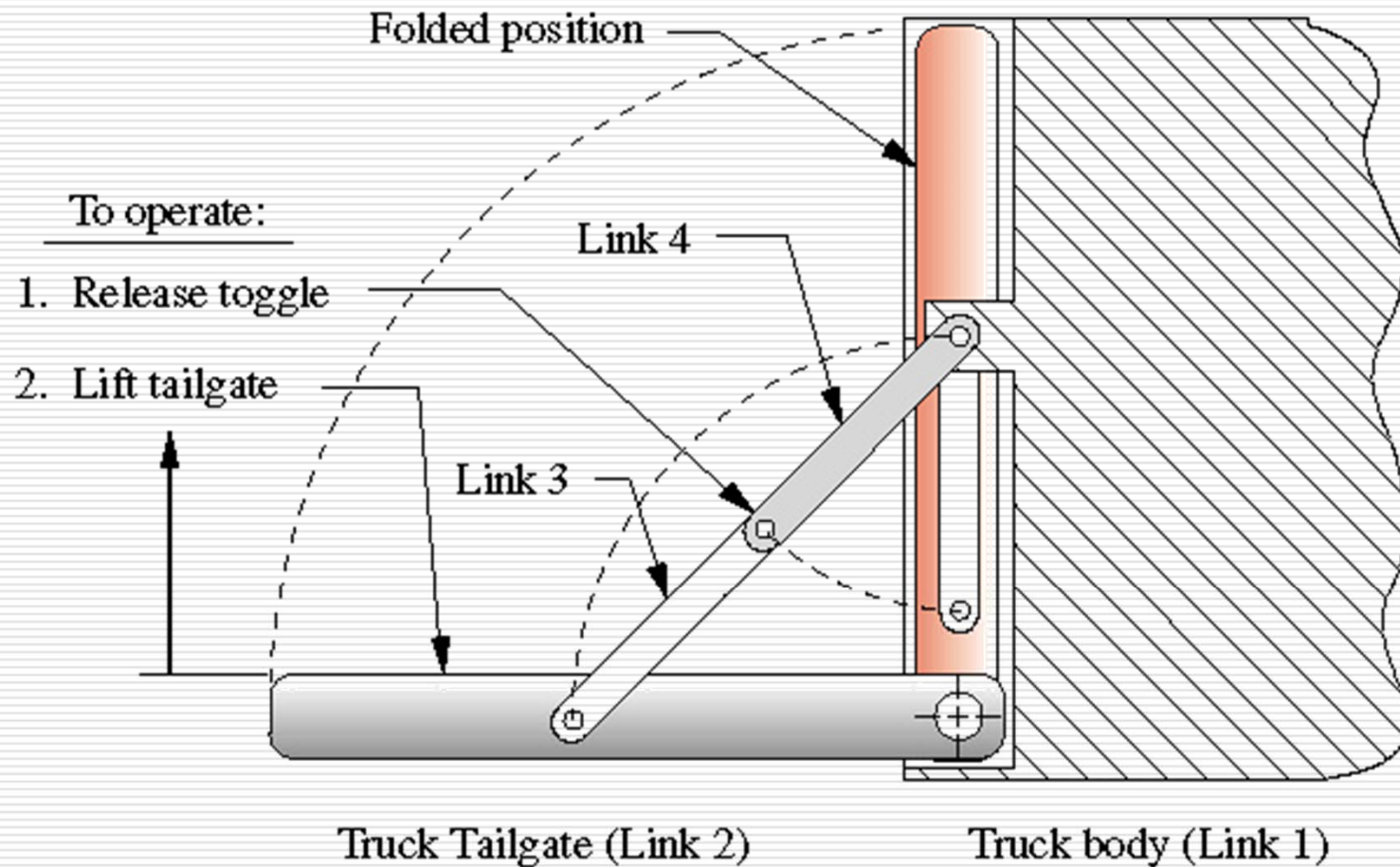
RBB



How Many Toggle Points?

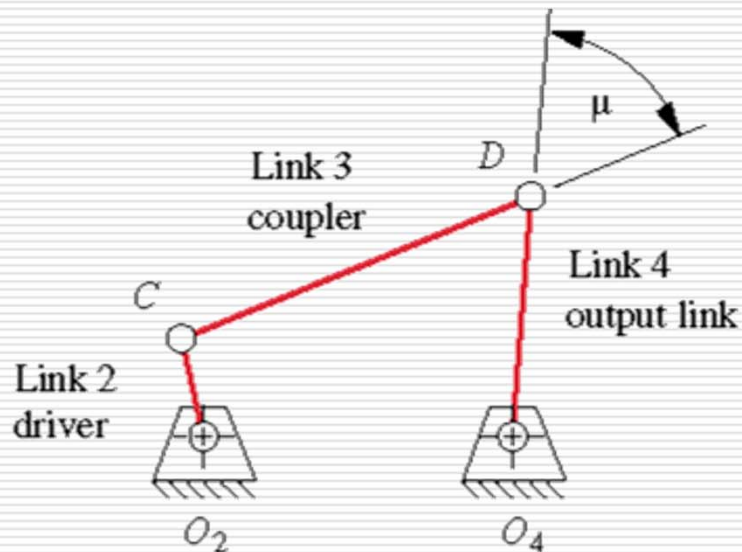


Stationary Positions In a Mechanism

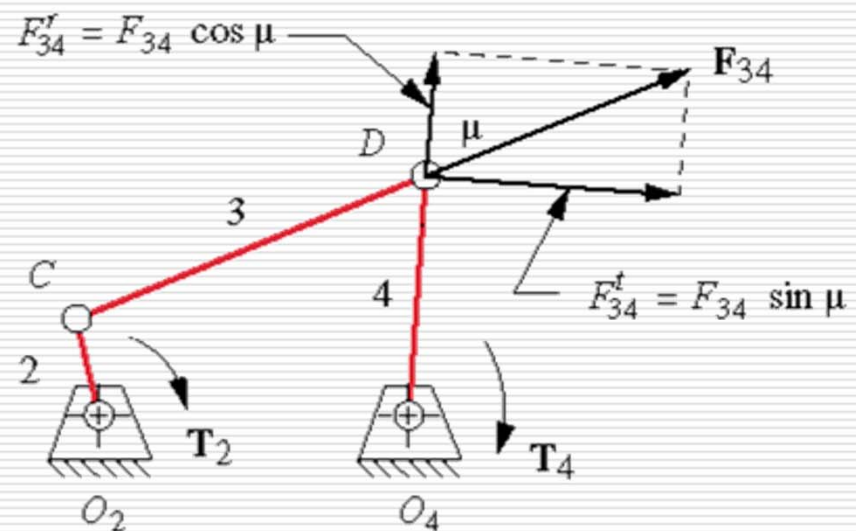


Transmission Angle

The **absolute value** of the **acute angle** of the pair of angles at the intersection of the two links and varies continuously from some minimum to some maximum value as the linkage goes through its range of motion. **RECOMMENDED $\mu > 40^\circ$**

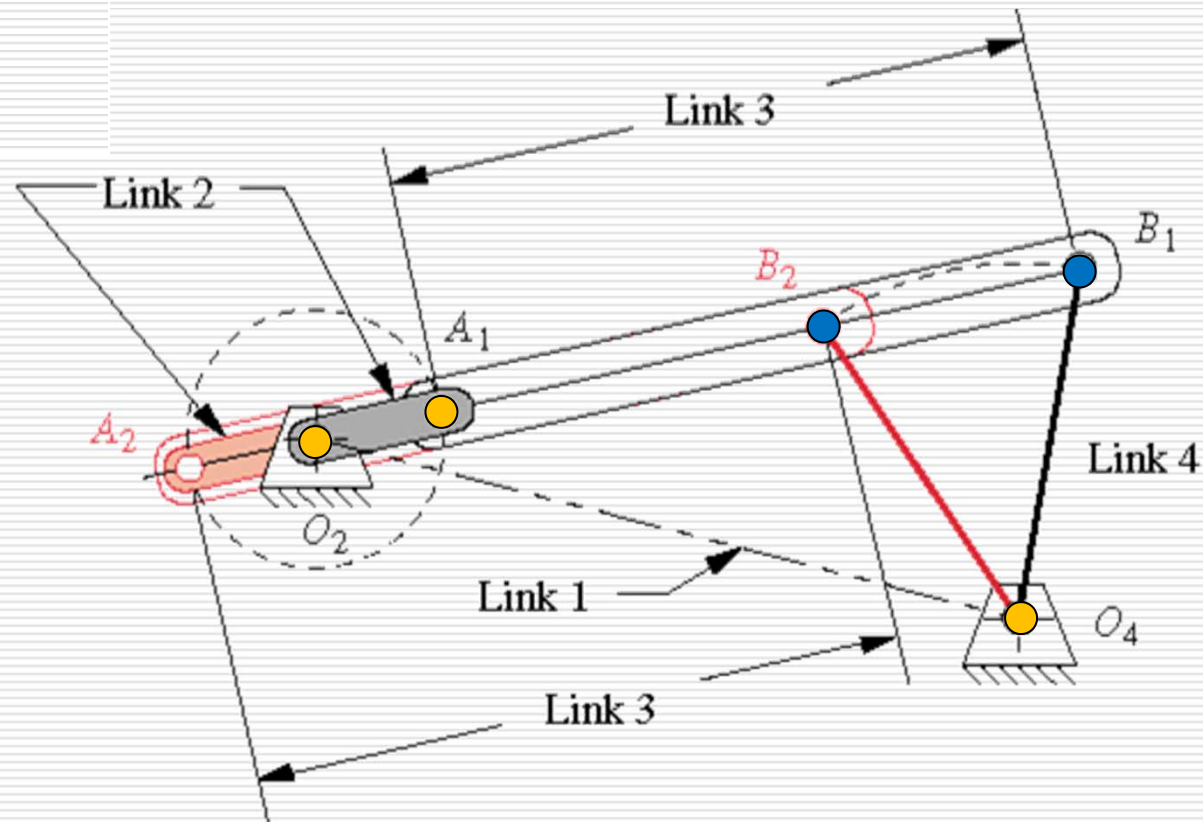


(a) Linkage transmission angle μ



(b) Static forces at a linkage joint

Two-Position Synthesis for Function Generation (Rocker Output)



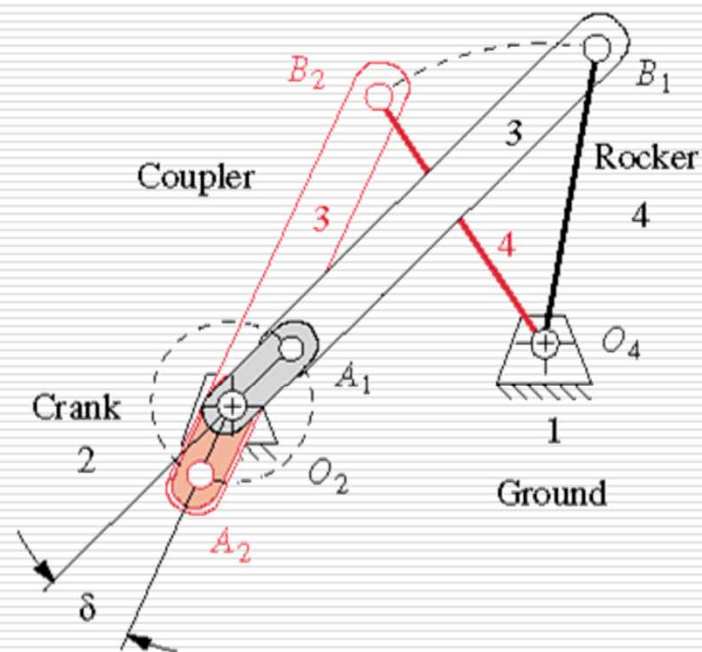
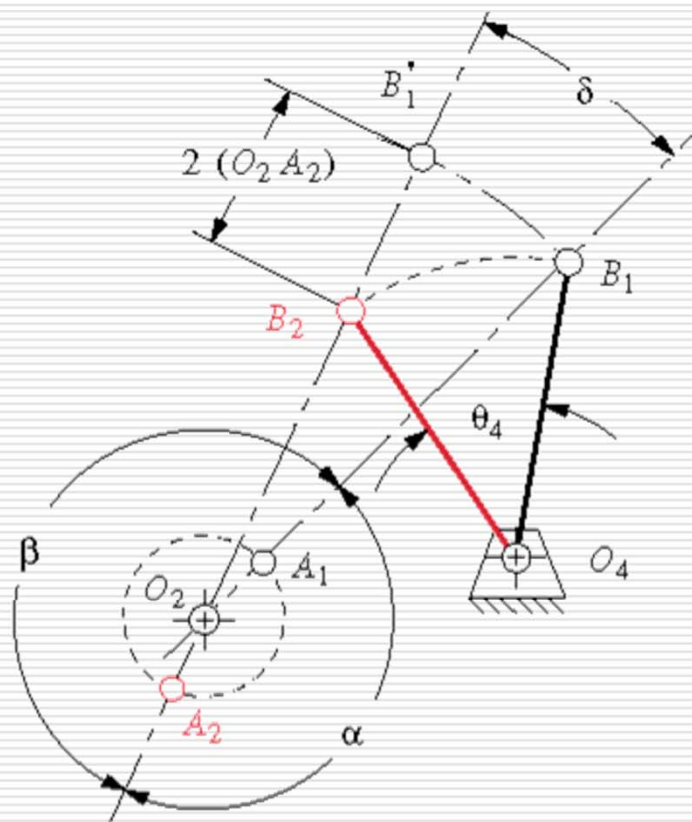
Problem

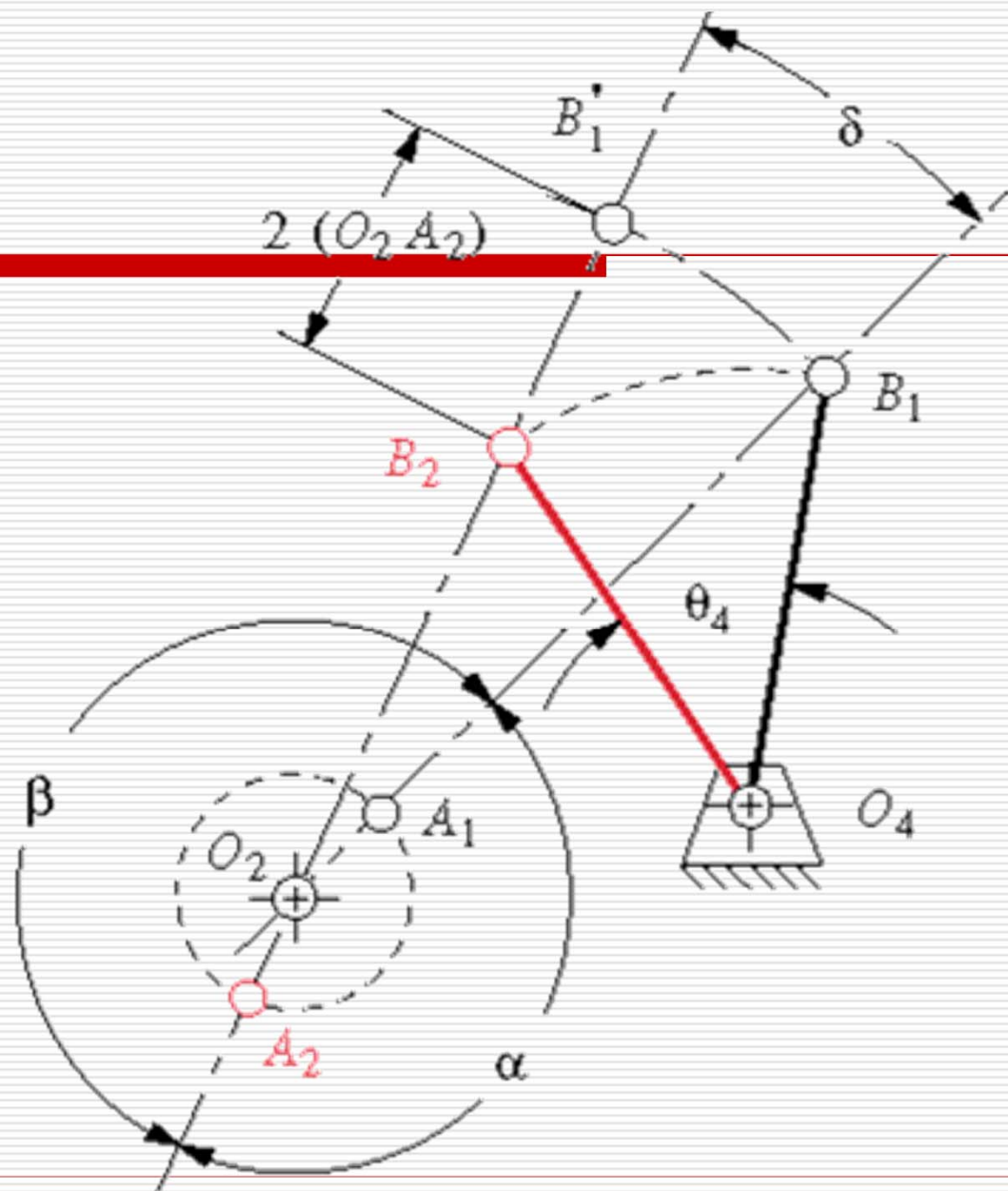
- Design a fourbar Grashof crank-rocker to give 45° of rocker rotation with equal time forward and back, from a constant speed motor input.

Graphical Linkage Synthesis

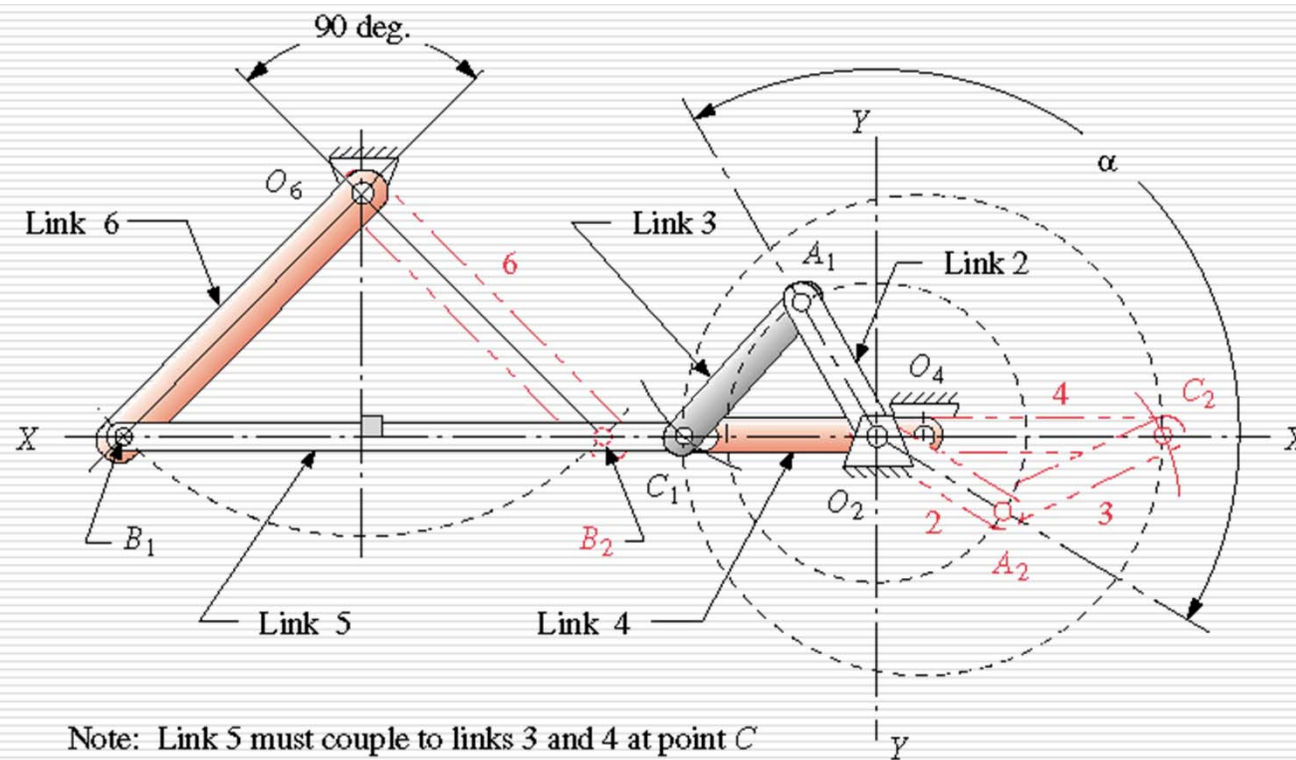
☐ Quick Return

Quick-Return Grashof Fourbar Crank-Rocker Linkage





Quick-Return Six Bar Rocker Mechanism



Quick-Return Six Bar Slider Mechanism

