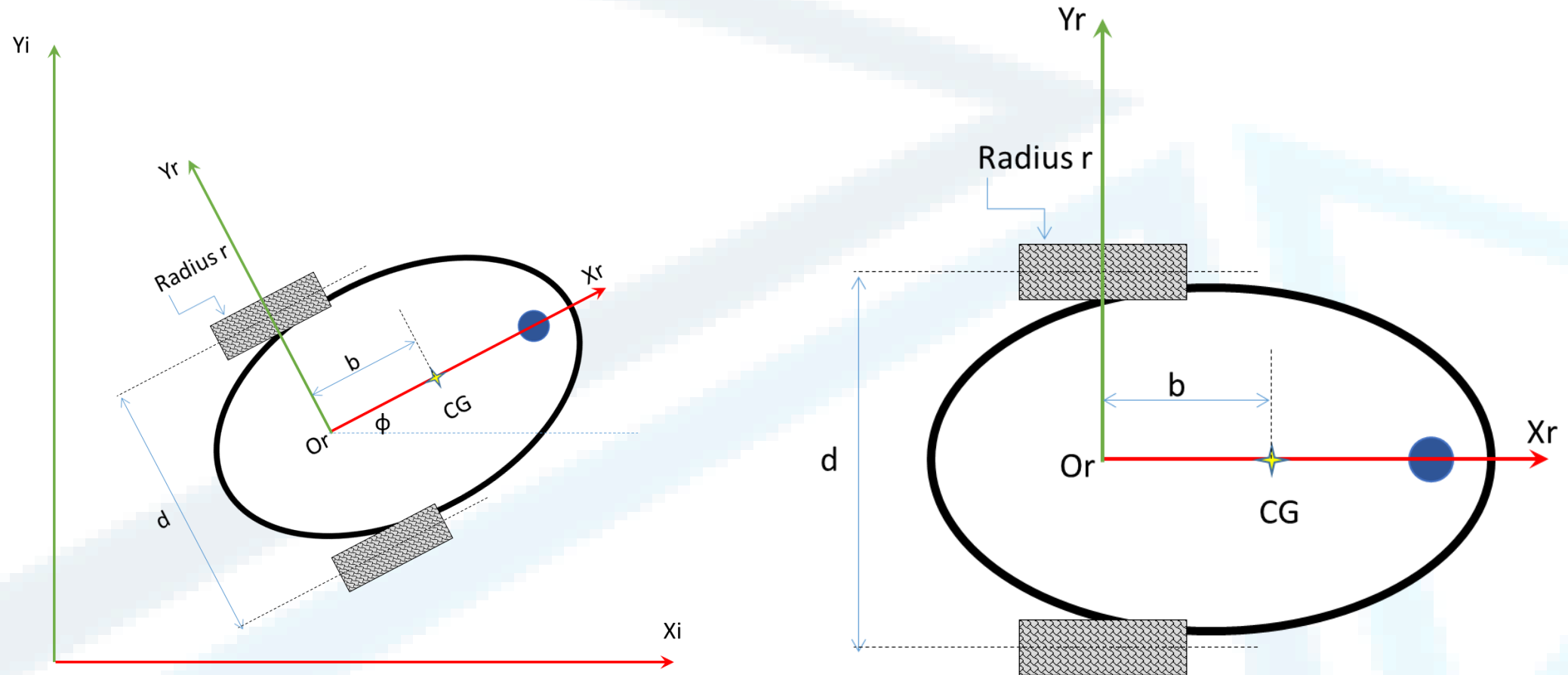# WMR Dynamic model

Exercise

Differential WMR

Find the dynamic model of the robot:

- There is a linear friction in the wheels

- Same friction coefficient ß

- The center of gravity of the robot **CG** does not coincide with the wheels midpoint **Or**

- The wheel-motor assemblies have a non-zero inertia I_0

- **Result:** $\mathbf{D}\ddot{\boldsymbol{\theta}} + \boldsymbol{\beta}\dot{\boldsymbol{\theta}} = \boldsymbol{\tau} \begin{cases} \boldsymbol{D} \in \boldsymbol{R^{2 \times 2}} \\ \boldsymbol{\theta} = [\boldsymbol{\theta_r} \quad \boldsymbol{\theta_l}]^{\boldsymbol{T}} \\ \boldsymbol{\tau} = [\boldsymbol{\tau_r} \quad \boldsymbol{\tau_l}]^{\boldsymbol{T}} \end{cases}$

Thanks

Think about MATLAB SIMULINK to validate the resultant model