

2-5596 Mechanika viazaných mechanických systémov (VMS)

pre špecializáciu Aplikovaná mechanika, 4.roč. zimný sem.

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Glossary for Singularities in Mechanisms

Actual mobility n_s	If a multibody system (MBS) has in reality actual mobility n_s which is different as theoretical mobility n computed from formula $n = n_v(u-1) - \sum_{t=1}^{t_m} t s_t$, so $n_s \neq n$, then such MBS is called incorrect.
Correct MBS	A multibody system (MBS) with actual mobility $n_s = n$ equal to the theoretical mobility n computed from formula $n = n_v(u-1) - \sum_{t=1}^{t_m} t s_t$ is called correct MBS. In a correct MBS each geometrical constraint of class t removes just the same number t DOF.
Incorrect MBS	Incorrect MBS has in reality actual mobility $n_s \neq n$ different as theoretical mobility n . The reason consist in fact, that formula $n = n_v(u-1) - \sum_{t=1}^{t_m} t s_t$ does not contain information neither about proportions (metrics) nor about mutual position (configurations) of links and geometrical joints. Theoretical mobility n of incorrect MBS may be zero (indicating a structure) or negative (indicating an indeterminate structure) but it can in reality, nevertheless, move, so its actual mobility $n_s \geq 1$ due to special proportions (metrics) and mutual position (configurations) of links and geometrical joints.
Unremoved DOF	Incorrect MBS has in reality actual mobility $n_s = n + n_N$ where n_N is number of unremoved DOF due to special proportions (metrics) and mutual position (configurations) of links and geometrical joints.
Singularities	Under common term singularities in MBS we denote all reasons (passivity, redundancy, general constraint, irregularity,...) which causes that $n_s \neq n$, hence actual mobility n_s is different as theoretical mobility n .
Total passivity	A constraint is totally passive if it can be removed and actual mobility of MBS does not change.
Partial passivity	A constraint of a class t is partially passive if it remove from MBS only number n_o DOF, $n_o < t$.

Overconstrained MBS	A MBS with theoretical mobility $n \leq 0$ and actual mobility $n_s \geq 1$ is overconstrained when actual mobility does not change after removing totally passive constraint.
Locked MBS	If redundant constraint in MBS become inconsistent with other constraints (due manufacturing differences in link lengths or pivot locations), this causes that MBS will jam (locked).
Local mobility n_L	Local mobility n_L is a passive (redundant) kinematic input which has no influence on the mobility of output link.
Active mobility n_A	Active mobility n_A is a active kinematic input which has influence on the mobility of output link $n_A = n_s - n_L$.
Singular state	A MBS is in instantaneous singular state, when its links can displace with infinitely small values of position coordinates. If MBS is at permanent singular state, its links can displace with finite values of position coordinates.