LHC Collimators for Phase 1

Direct and backdriving torque for different collimator configurations

73rd CDM 29/09/2005

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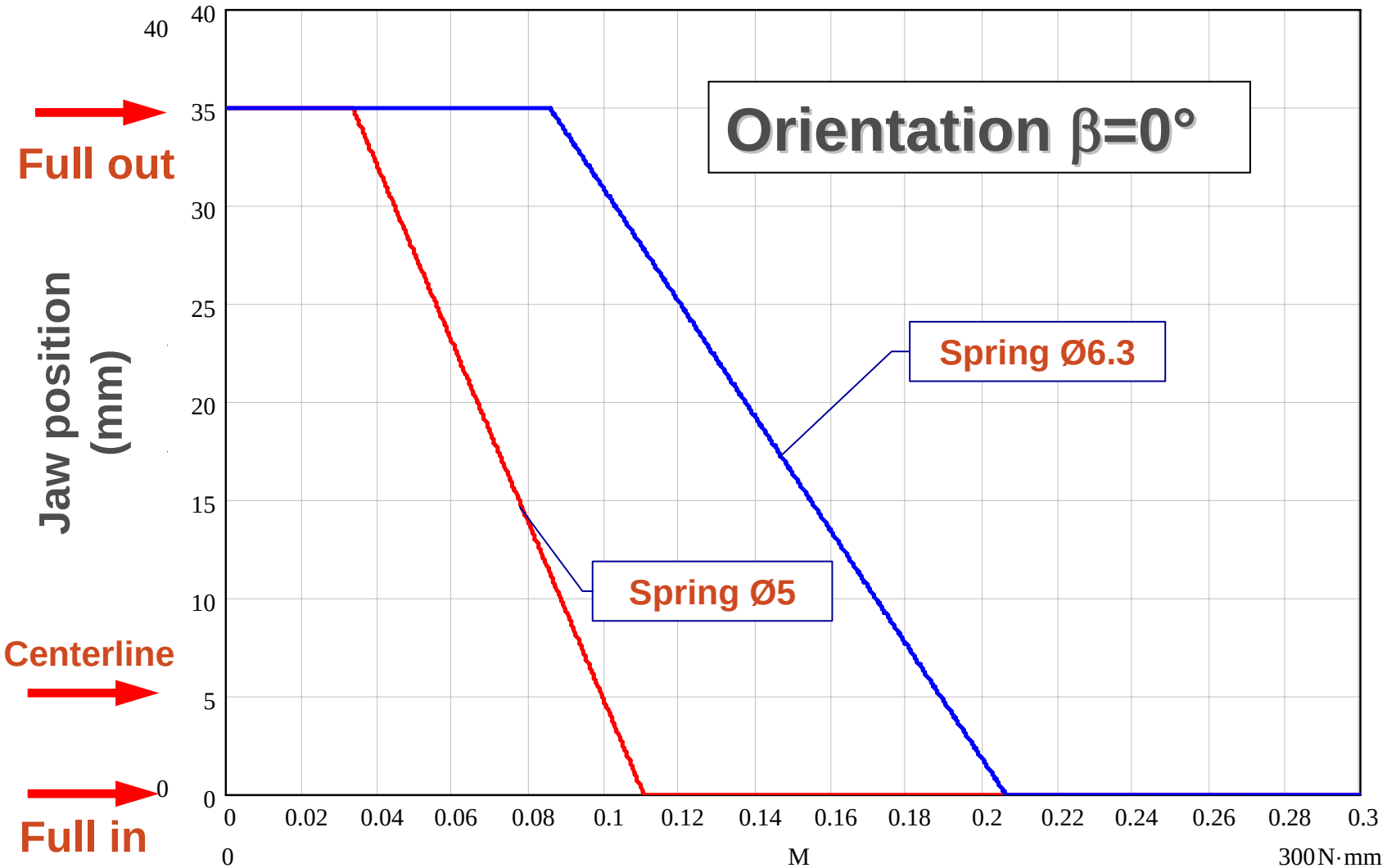
Torque calculations

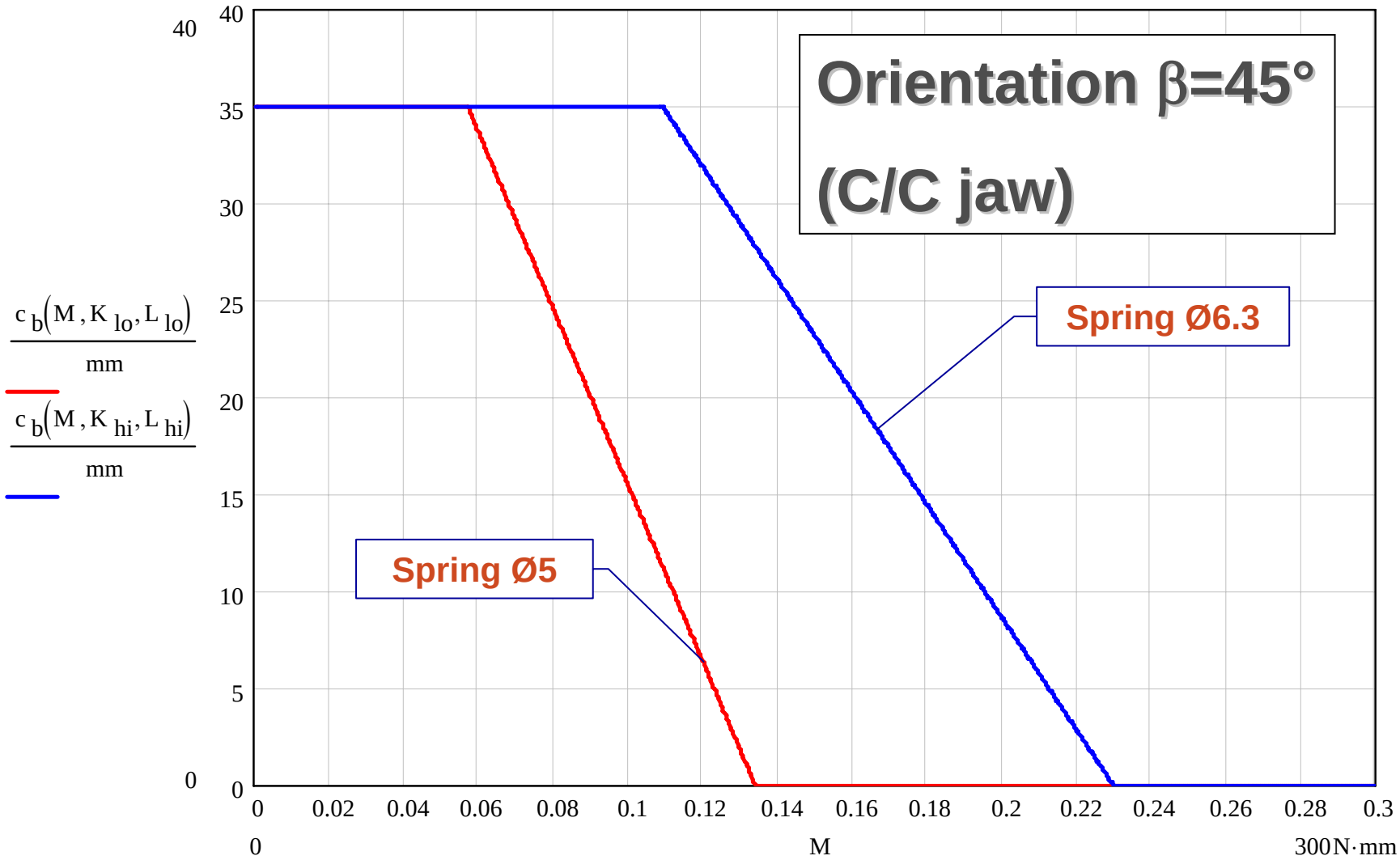
Hypotheses

- Weight of jaw assembly: Carbon 300N – Metal 450N
- Weight of axle assembly: 100 N
- Effect of bellow and vacuum: included
- Ball bearing friction: not included (except for max reqd. torque)
- Inertia effects: not included
- RF friction: 10 N
- Table friction: 8.5 N
- Direct screw efficiency: $\eta = 0.67$
- Reverse screw efficiency: $\eta' = 0.5$
- Motor backdriving force: $F = 2\pi M / \eta' p$
  (e.g. if M=200Nmm and p=2mm ⇨ F=1380 N)

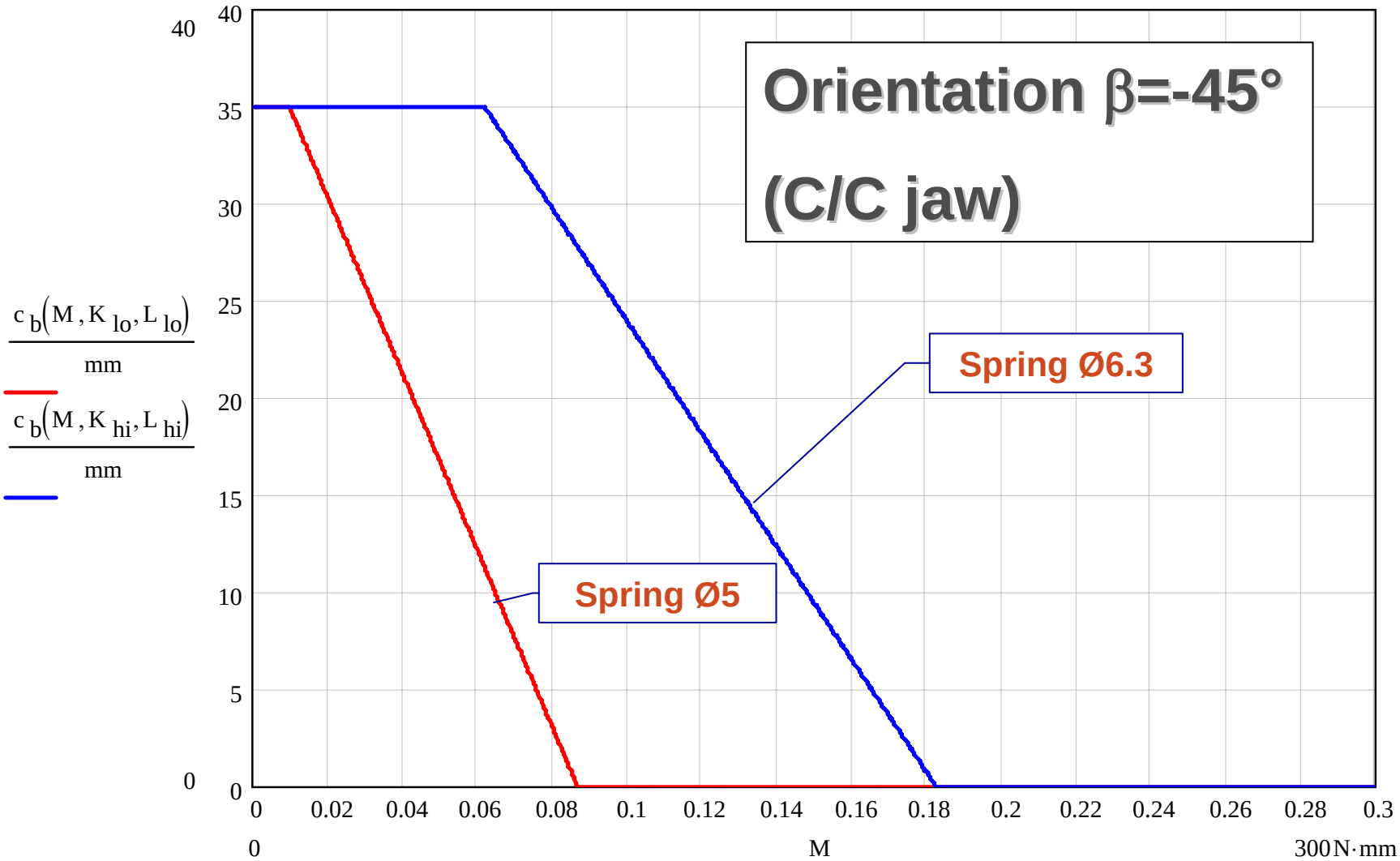
Return stroke versus motor residual torque



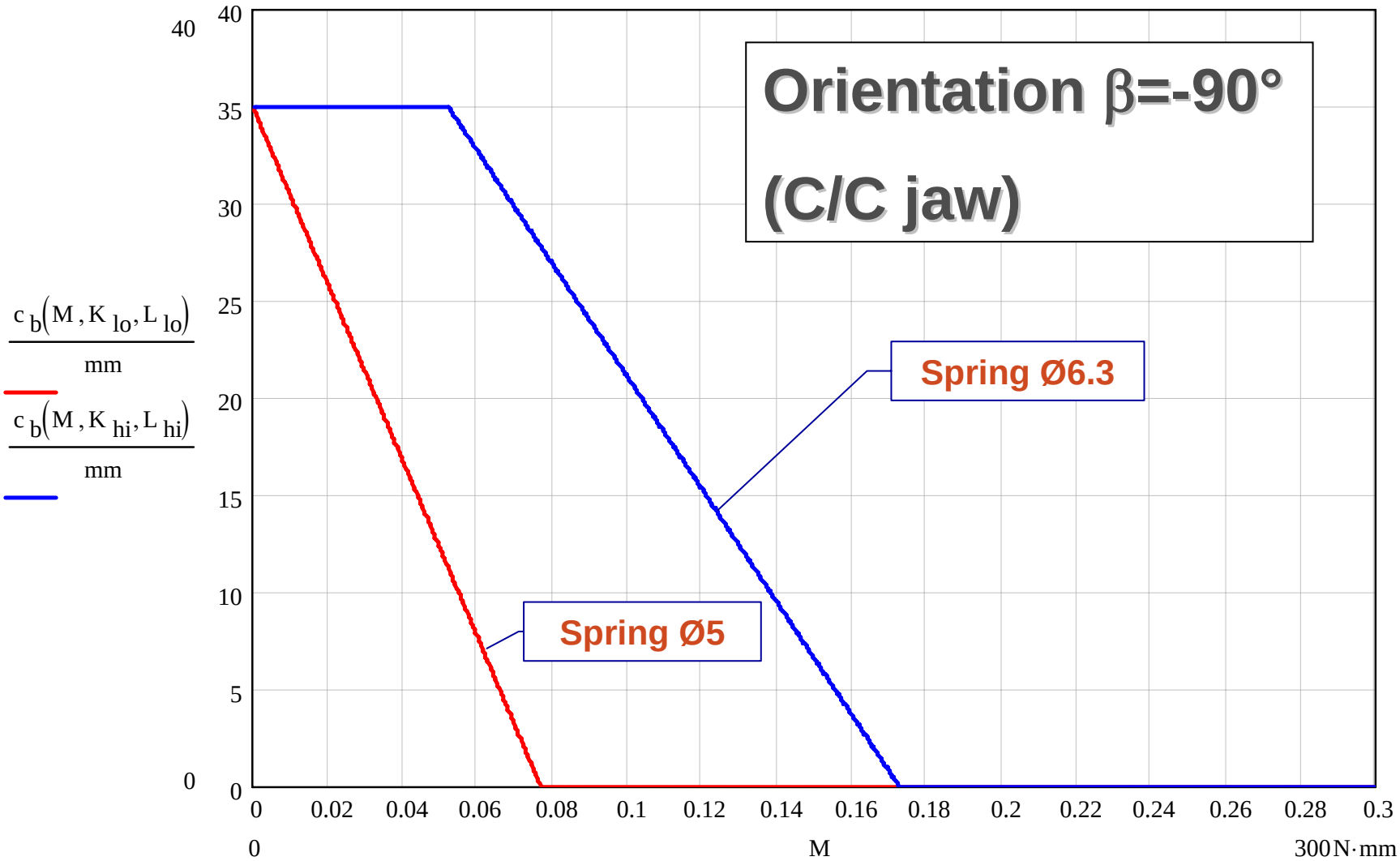
Return stroke versus motor residual torque



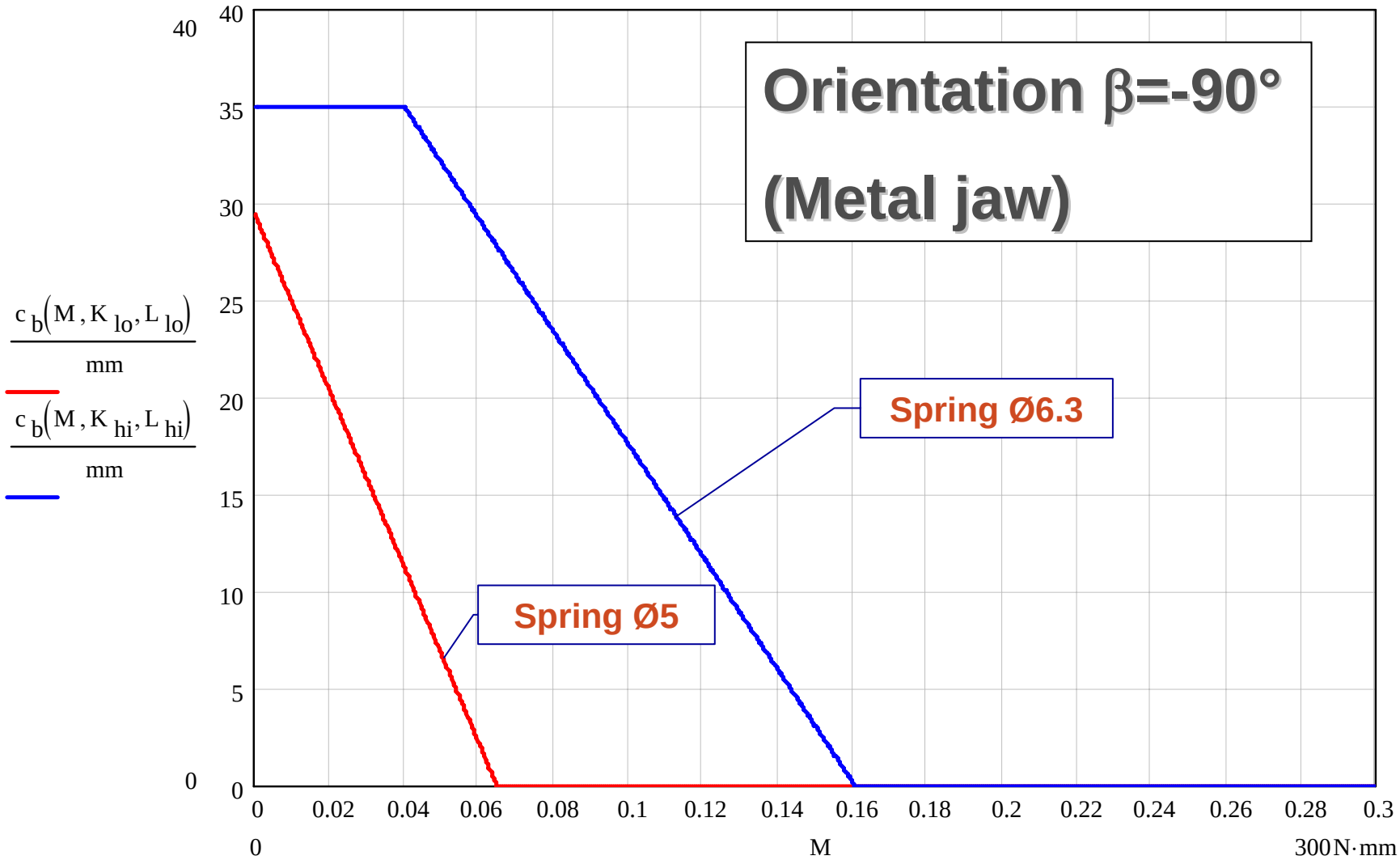
Return stroke versus motor residual torque



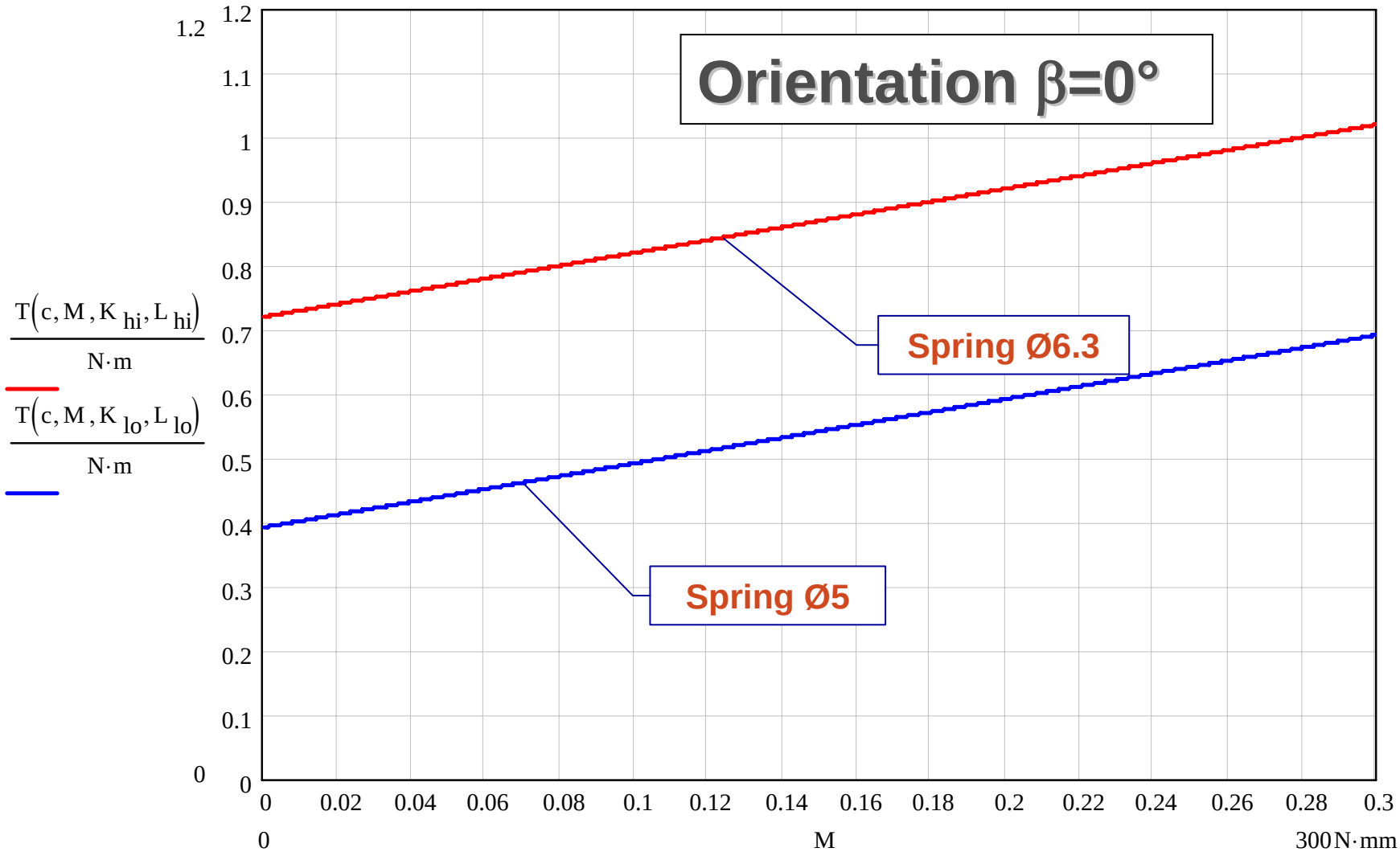
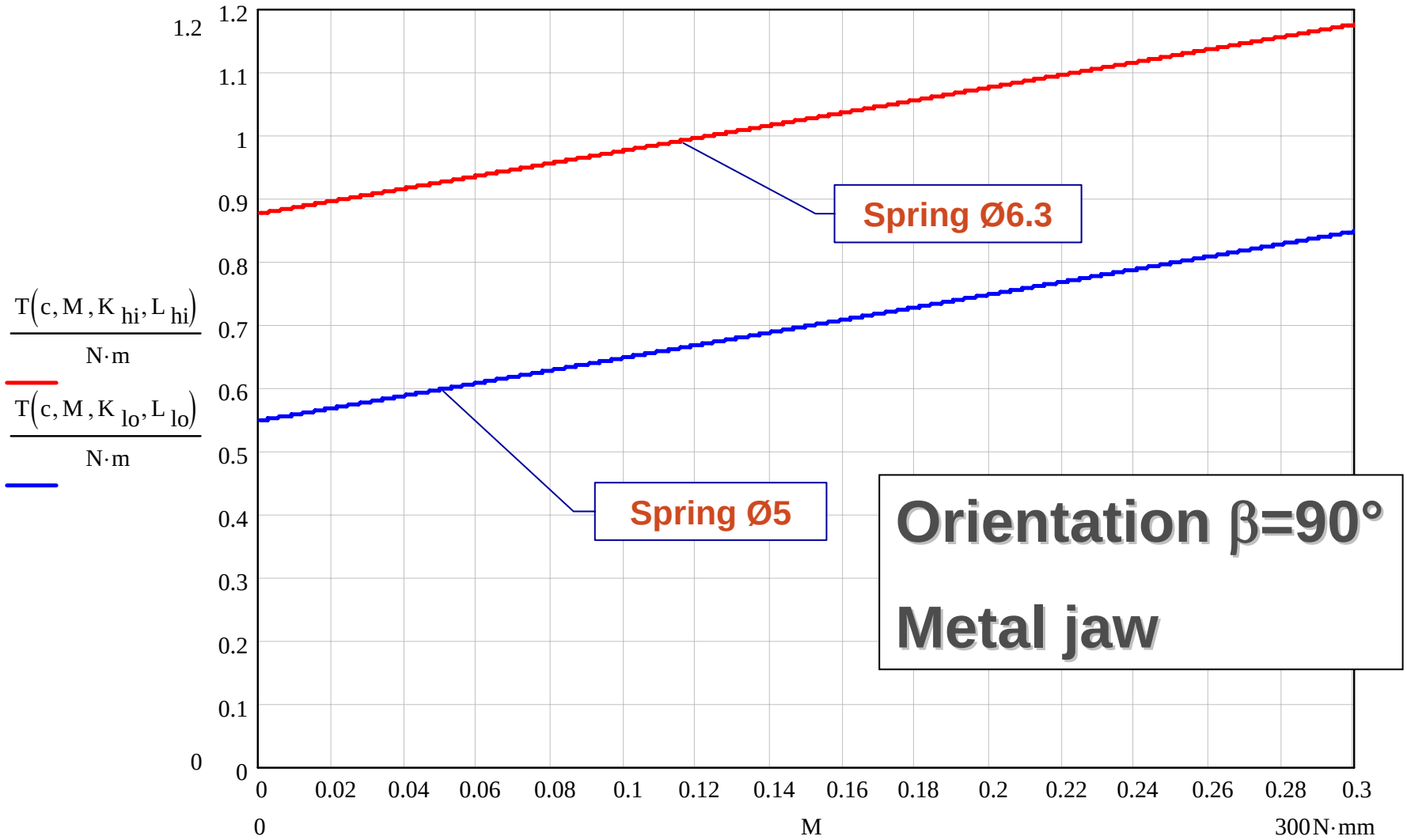
Return stroke versus motor residual torque



Return stroke versus motor residual torque



Max required torque versus friction torque



Max direct (required) torque versus friction torque (motor “lost” torque)