

Selected Technical Terms in Mechanics of Materials

材料力学部分专业术语中英文对照

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This tabulated list of selected technical terms in mechanics of materials is developed by Changwen Mi to facilitate the students in various engineering majors at the Southeast University. This file reflects part of our constant efforts in implementing bilingual teaching of a series of undergraduate and graduate mechanics courses hosted by the Department of Engineering Mechanics at the Southeast University. We had made every effort to ensure the accuracy and completeness of this file for the students' sake. We, however, make no guarantee of the effects of using this file.

Geometric properties of an area 截面几何性质

centroid 形心

centroidal axis 形心轴

first moment of an area 静矩

moment of inertia; second moment of an area 惯性矩

parallel axis theorem 平行移轴定理

products of inertia 惯性积

polar moment of inertia 极惯性矩

radius of gyration 惯性半径

composite area 组合截面

principal centroidal axis 主形心轴

principal moment of inertia 主惯性矩

principal moments of inertia about centroidal axes 主形心惯性矩

Structural members 构件

bar 杆

prismatic bars 等截面直杆

shaft 轴

column 柱 (只受压缩)

thin-walled tubes (闭口) 薄壁杆

thin-walled open tubes 开口薄壁杆

pressure vessel 压力容器

beam 梁

neutral surface 中性层

neutral axis 中性轴

simply supported beams 简支梁

cantilever beams 悬臂梁

composite beams 复合梁

overhanging beams 外伸梁

continuous beams 连续梁

fully stressed beams; beams of constant strength 等强度梁

beams of variable cross section 变截面梁

wide-flange beams 工字梁

web 腹板

flange 翼缘

fixed support; clamped support 固定端

pin support 固定铰支座

roller support 可动铰支座

curved beams 曲梁

truss 桁架

frame 刚架

cross-section 横截面

oblique cross-section

axis 轴线

rigid joint 刚性结点

Loads 荷载/载荷

force 力

force couple 力偶

moment 力矩

moment of a couple 力偶矩

unit load 单位力

unit couple 单位力偶

concentrated loads 集中力

distributed loads 分布力

intensity of distributed loads 分布力的集度

surface force 面力

body force 体积力

static loads 静载

dynamic loads 动载

allowable loads 许用荷载

reaction 反作用力

internal forces 内力

axial force 轴力

shear force 剪力

Stress, Strain and Deformation 应力、应变及变形

normal stress 正应力

nominal stress 名义应力

true stress 真实应力

average stress 平均应力

maximum stress 最大应力

minimum stress 最小应力

allowable stress 许用应力

shear stress 剪切应力

pure shear 纯剪切
normal strain 正应变
nominal strain 名义应变
true strain 真实应变
shear strain 切应变
deformation 变形
displacement 位移
deflection 挠曲

Common Terms in Mechanics of Deformable Bodies 可变形体力学常用术语

mechanics of materials 材料力学
strength of materials 材料力学
mechanics of deformable bodies 变形体力学
strength 强度
stiffness 刚度
stability 稳定性
homogeneity/homogeneous 均质/匀质的
continuity/continuous 连续性/连续的
isotropy/isotropic 各向同性/各向同性的
infinitesimal elastic deformation 微小弹性变形
elasticity 弹性
elastic deformation 弹性变形
linearly elastic body 线性弹性体
mechanical properties 力学性质
plasticity 塑性
elastoplastic materials 弹塑性材料
tension 拉伸
compress 压缩
shearing 剪切

torsion 扭转

bending 弯曲

buckling 失稳

allowable load method 许用荷载法

allowable stress 许用应力

allowable stress method 许用应力法

method of safety factor 安全系数法

method of discount factor 折扣系数法

factor of safety 安全系数

stress concentration factor 应力集中因数

residual stress / initial stress / prestress 残余应力初应力, 预应力

stress distribution 应力分布

equation of equilibrium 平衡方程

method of sections 截面法

Other Mechanical Terms 其它力学术语

dimensionless quantities 无量纲量

composite material 复合材料

specimen 试件

elastic-perfectly plastic assumption 理想弹塑性假设

plastic hinge 塑性铰

Axial Loading 轴向荷载

axially loaded bars 拉压杆, 轴向承载杆

axial tension 轴向拉伸

axial compression 轴向压缩

axial forces 轴向力

internal forces 内力

method of section 截面法

diagram of axial forces 轴力图
stress tensor 应力张量
longitudinal 纵向的
transverse 横向的
Saint-Venant's Principle 圣维南原理
stresses on oblique planes 斜截面上的应力
axial deformation 轴向变形
elongation 伸长量
extensometer 引伸计、伸展仪、伸长计
uniaxial stress 单向应力, 单轴应力
normal stress 正应力
sign convention 符号规定
transverse/lateral strain 横向应变
Tension/compression rigidity 拉压刚度 (EA)
stress concentration factor 应力集中系数

Mechanical Behavior of Materials 材料力学行为

gauge length 标记长度
constitutive relations 本构关系 (物理方程)
Hooke's Law 胡克定律
generalized Hooke's law 广义胡克定律
stress-strain diagram 应力应变图
Hook's law of shearing 剪切胡克定律
brittle 脆性
brittle materials 脆性材料
ductile 韧性
ductile materials 塑性材料, 韧性材料, 延展性材料
plastic deformation 塑性变形, 残余变形
creep 蠕变

relaxation 松弛
proportional limit 比例极限
elastic modulus; modulus of elasticity 弹性模量
Young's modulus 杨氏模量
elastic limit 弹性极限
yield stress 屈服应力
yield strength 屈服强度
offset yield stress 名义屈服强度
strain hardening 强化, 冷作硬化
ultimate strength, strength limit 强度极限
ultimate stress 极限应力
low carbon steel 低碳钢
cast iron 铸铁
transversely isotropic 横向同性
necking 颈缩
plastic flow 塑性流动
percent reduction in area 断面收缩率
percent elongation 延伸率
bulk modulus 大块模量, 体积模量
Poisson's ratio 泊松比

Shearing and bearing Stress 剪切和挤压应力

Shear/shearing 剪切
Shear/shearing stress 切应力
bearing 挤压
bearing stress 挤压应力
bearing surface 挤压面
single shear 单剪
double shear 双剪

rod 吊杆
boom 托架
pin 销钉
rivet 铆钉
joints/connectors 连接件
lap joint 搭接
butt joint 对接
pure shear 纯剪切
theorem of conjugate shearing stress 切应力互等定理
shear modulus 切变模量
ultimate shear stress 剪切极限应力
yield shear stress 剪切屈服应力

Torsion 扭转

torsional moment 扭矩
twisting moment 扭力矩
power & torque 功率与扭矩
torque diagram 扭矩图
angle of twist 扭转角
angle of twist per unit length 单位长度扭转角
torsional rigidity 抗扭刚度, 扭曲刚度
section modulus in torsion 抗扭截面系数
slip-lines 滑移线
slip bands 滑移带, 剪切带
free torsion 自由扭转
constrained torsion 约束扭转

Bending 弯曲

symmetric bending 对称弯曲

symmetric longitudinal plane 纵向对称面
transverse loading 横向荷载
shear force 剪力
shear flow 剪流
shear force diagram 剪力图
equation of shear forces 剪力方程
bending moment 弯矩
equation of bending moment 弯矩方程
bending moment diagram 弯矩图
pure bending 纯弯曲
Transverse bending 横力弯曲
plane cross-section hypothesis 平面假设
hypothesis of uniaxial stress 单轴应力假设
neutral surface 中性层
neutral axis 中性轴
bending normal stress 弯曲正应力
section modulus 抗弯截面系数
bending shear stress 弯曲切应力
constant-strength beam; fully stressed beams 等强度梁
deflection 挠曲, 挠度
angle of rotation 转角
slope 斜率
curvature 曲率
radius of curvature 曲率半径
deflection curve 挠曲线
approximate differential equation of deflection 挠曲轴近似微分方程
flexural rigidity 抗弯刚度
method of successive integrations 积分法
boundary condition 边界条件

continuity condition 连续性条件
symmetry condition 对称性条件
method of superposition 叠加法
linear superposition 线性叠加
superposition of loads 荷载叠加
superposition of rigidized structures 刚化叠加, 变形叠加
method of singular/discontinuity function 奇异函数法
boundary values 边界值
moment-area theorems 图乘法
unsymmetric bending 不对称弯曲
shear center 弯曲中心
bending strain energy 弯曲应变能

Indeterminate Problems 超静定问题

statically determinate problem 静定问题
statically indeterminate problem 静不定问题, 超静定问题
degree of static indeterminacy 静不定次, 超静定次数
redundancy 冗余, 多余
redundant restraint 多余约束
basic determinate system 基本静定系
force method 力法
equation of deformation compatibility 变形协调方程
complementary equation 补充方程
thermal stress 热应力
coefficient of thermal expansion 线胀系数
assembly stress 装配应力
residual stress 残余应力
thermal strain 热应变
eigenstrain 特征应变

Stress States 应力状态

state of stress 应力状态

damage mechanisms 破坏机制

stress state of a point 一点应力状态

transformation of stresses 应力变换

principal stresses 主应力

principal axes 主轴，主方向

stress circle 应力圆

Mohr's Circle 莫尔圆

state of biaxial stress 二向应力状态

state of plane stress 平面应力状态

state of triaxial stress 三轴（复杂）应力状态

triaxial stress 三向应力

experimental stress analysis 实验应力分析

volumetric strain energy density 体积应变能密度

distortional strain energy density 畸变能密度

volumetric strain 体应变

decomposition of stress tensor 应力张量分解

transformation of strain 应变变换

Strength Theory 强度理论

strength condition 强度条件

equivalent stress 相当应力

maximum tensile stress theory 最大拉应力理论

maximum tensile strain theory 最大拉应变理论

maximum shear stress theory 最大切应力理论

maximum distortion energy theory 最大畸变能理论

Mohr theory of failure 莫尔强度理论

measurements of strain 应变测量

strain gauge 应变计

strain rosette 应变花

three-element rectangular rosette 三轴直角应变花

three-element delta rosette 三轴等角应变花

full bridge 全桥接线法

half bridge 半桥接法

bridge balancing 电桥平衡

compensating block 补偿块

Combined Loadings 组合荷载

eccentric tension 偏心拉伸

eccentric compression 偏心压缩

core of cross-sections 截面核心

Stability of Columns 压杆稳定

buckling 屈曲

stability condition 稳定条件

Euler's formula 欧拉公式

critical load 临界压力

critical stress 临界应力

equivalent length 相当长度, 有效长度

coefficient of equivalent length 长度因数

slenderness ratio (压杆的) 柔度或长细比

long columns 大柔度杆

intermediate columns 中柔度杆

short columns 小柔度杆

safety factor of stability 稳定安全因数

discount factor of stability 折扣安全因数

Energy Methods 能量方法

strain energy 应变能

strain energy density 应变能密度

modulus of resilience 回弹模量

modulus of toughness 韧度模量

principle of work and energy 功能互等定理

Castigliano's theorem 卡氏定理

reciprocal theorem of displacement; Maxwell's reciprocal theorem 位移互等定理

method of dummy, method of virtual forces 虚力法

method of unit dummy load 单位力法

Dynamic Loading 冲击荷载

impact load 冲击荷载

dynamic load 动荷载

constant acceleration 等加速

constant rotation 等角速转动

horizontal impact 水平冲击

vertical impact 竖直冲击

statically equivalent load 静力等效荷载

dynamic load factor 动荷系数

Cyclic Loading and Fatigue 交变荷载及疲劳

cyclic/alternate load 交变荷载

cyclic stress 交变应力, 循环应力

fatigue failure 疲劳失效

stress amplitude 应力幅

stress scope 应力范围

cycle characteristics 循环特征

symmetric cycling 对称循环

unsymmetric cycling 非对称循环
pulse cycling 脉冲循环
fatigue life 疲劳寿命
stress-life diagram 应力-寿命曲线, S-N 曲线
endurance limit 疲劳极限
fatigue strength 疲劳强度
surface roughness 表面粗糙度
surface strength 表面强度
equal-amplitude fatigue 等幅疲劳
fatigue strength condition 疲劳强度条件
fatigue factor of safety 疲劳安全因数