

Handout #29

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function [K,KT]=frame1(dx,dy,E,I,A)

%FRAME1 Formation of 6x6 plane frame element stiffness matrix
% K=frame1(dx,dy,E,I,A)
% K = 6x6 stiffness matrix
% dx = directed projection of the member on the X-axis
% dy = directed projection of the member on the Y-axis
% E = modulus of elasticity
% I = cross-sectional moment of inertia
% A = cross-sectional area

K=zeros(6);
L = sqrt(dx^2 + dy^2);
constant=1/L;
K(1,1)=A*E;
K(1,4)=-K(1,1);
K(2,2)=(12*E*I)/L^2;
K(2,3)=(6*E*I)/L;
K(2,5)=-K(2,2);
K(2,6)=K(2,3);
K(3,3)=4*E*I;
K(3,5)=-K(2,3);
K(3,6)=2*E*I;
K(4,4)=K(1,1);
K(5,5)=K(2,2);
K(5,6)=-K(2,3);
K(6,6)=K(3,3);
%Form the lower symmetric part
d=zeros(1,6);
K1=triu(K);
K1=stodg(K,d);
K1=K1';
K=(K+K1)*constant;
%Transformation matrix
T=zeros(6);
T(1,1)=dx;
T(1,2)=dy;
T(2,1)=-dy;
T(2,2)=dx;
T(3,3)=L;
T(4,4)=dx;
T(4,5)=dy;
T(5,4)=-dy;
T(5,5)=dx;
T(6,6)=L;
T=T*constant;
K1=K;
K=T'*K1*T;

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