

SU

```
% Loop on elements
for ielem = 1:nElem
    Te = T(ielem,:);
    Xe = X(Te);
    h = Xe(end) - Xe(1);

    Ke = zeros(nen);
    fe = zeros(nen,1);
    % Loop on Gauss points
    for ig = 1:ngaus
        N_ig = N(ig,:);
        Nx_ig = Nxi(ig,:)*2/h;
        w_ig = wgp(ig)*h/2;
        Ke = Ke + w_ig*(N_ig'*a*Nx_ig + Nx_ig'*nu*Nx_ig+N_ig'*sig) ...
            + w_ig*(tau*a*Nx_ig)'*(a*Nx_ig);
        x = N_ig*Xe; % x-coordinate of the gauss point
        s = SourceTerm(x,example);
        fe = fe + w_ig*(N_ig)'*s;
    end
    % Assembly
    K(Te,Te) = K(Te,Te) + Ke;
    f(Te) = f(Te) + fe;
end
```

SUPG

```
% Loop on elements
for ielem = 1:nElem
    Te = T(ielem,:);
    Xe = X(Te);
    h = Xe(end) - Xe(1);

    Ke = zeros(nen);
    fe = zeros(nen,1);
    % Loop on Gauss points
    for ig = 1:ngaus
        N_ig = N(ig,:);
        Nx_ig = Nxi(ig,:)*2/h;
        w_ig = wgp(ig)*h/2;
        Ke = Ke + w_ig*(N_ig'*a*Nx_ig + Nx_ig'*nu*Nx_ig+N_ig'*sig) ...
            + w_ig*(tau*a*Nx_ig)'*(a*Nx_ig-(nu*Nxx_ig)+sig);
        x = N_ig*Xe; % x-coordinate of the gauss point
        s = SourceTerm(x,example);
        fe = fe + w_ig*(N_ig)'*s+w_ig*(tau*a*Nx_ig)'*s;
    end
    % Assembly
    K(Te,Te) = K(Te,Te) + Ke;
    f(Te) = f(Te) + fe;
end
```

GLS

```
% Loop on elements
for ielem = 1:nElem
    Te = T(ielem,:);
    Xe = X(Te);
    h = Xe(end) - Xe(1);

    Ke = zeros(nen);
    fe = zeros(nen,1);
    % Loop on Gauss points
    for ig = 1:ngaus
        N_ig = N(ig,:);
        Nx_ig = Nxi(ig, :)*2/h;
        w_ig = wgp(ig)*h/2;
        Ke = Ke + w_ig*(N_ig'*a*Nx_ig + Nx_ig'*nu*Nx_ig+N_ig'*sig) ...
            + w_ig*(tau*(a*Nx_ig-(nu*Nxx_ig)+N_ig*sig))'*(a*Nx_ig-(nu*Nxx_ig)+sig);
        x = N_ig*Xe; % x-coordinate of the gauss point
        s = SourceTerm(x,example);
        fe = fe + w_ig*(N_ig)'*s+w_ig*(tau*(a*Nx_ig-(nu*Nxx_ig)+N_ig*sig))'*s;
    end
    % Assmebly
    K(Te,Te) = K(Te,Te) + Ke;
    f(Te) = f(Te) + fe;
end
```