```
function S = SmatrixQuat(q)

% Usage: Sba_b = SmatrixQuat(q)
%
% Description: This function take in a rotation represented as a
 quaternion
% and returns the mapping matrix from the quaternion to angular
 velocity
%
% Inputs:
%   q  -  4 x 1 quaternion vector consisting of [epsilon(3 x 1) eta]'
%         representing a rotation between two coordinate frames
%
% Outputs:
%   S  -  3 x 4 matrix that maps the quaternion rate of change to the
%         angular velocity between two frames
%
% Garrett Ailts
% Updated 1/2020
%
```

Compute S

```
S = 2*[(q(4)*eye(3)-crossMatrix(q(1:3))) -q(1:3);
       q(1:3)' q(4)];

end
```

```
Sba_b =

    1.9318    0.3678   -0.2588   -0.2588
   -0.3678    1.9318    0.2588   -0.2588
    0.2588   -0.2588    1.9318   -0.3678
    0.2588    0.2588    0.3678    1.9318
```

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