

## hesian

briefly

[called by: [xspech](#).][calls: [packxi](#) and [dforce](#).]

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<b>1.0.1</b>	<b>construction of Hessian matrix</b>	
1.	The routine <a href="#">dforce</a> is used to compute the derivatives, with respect to interface geometry, of the force imbalance harmonics, $[[p + B^2/2]]_j$ , which may be considered to be the “physical” constraints, and if <a href="#">Igeometry.eq.3</a> then also the derivatives of the “artificial” spectral constraints, $I_j \equiv (R_\theta X + Z_\theta Y)_j$ .	
2.	The input variable <a href="#">Lconstraint</a> determines how the enclosed fluxes, $\Delta\psi_t$ and $\Delta\psi_p$ , and the helicity multiplier, $\mu$ , vary as the geometry is varied; see <a href="#">global</a> and <a href="#">mp00ac</a> for more details.	
<b>1.0.2</b>	<b>construction of eigenvalues and eigenvectors</b>	
1.	If <a href="#">LHevalues.eq.T</a> then the eigenvalues of the Hessian are computed using the NAG routine <a href="#">NAG: F02EBF</a> .	
2.	If <a href="#">LHevectors.eq.T</a> then the eigenvalues <i>and</i> the eigenvectors of the Hessian are computed.	
3.	Note that if <a href="#">Igeometry.eq.3</a> , then the derivative-matrix also contains information regarding how the “artificial” spectral constraints vary with geometry; so, the eigenvalues and eigenvectors are not purely “physical”.	
4.	The eigenvalues and eigenvectors (if required) are written to the file <code>+.ext.GF.ev</code> as follows:	

```

open(hunit,file="."//trim(ext)//".GF.ev",status="unknown",form="unformatted")
write(hunit)NGdof,Ldvr,Ldvi      ! integers; if only the eigenvalues were computed then Ldvr=Ldvi=1;
write(hunit)evalr(1:NGdof)      ! reals    ; real      part of eigenvalues;
write(hunit)evali(1:NGdof)      ! reals    ; imaginary part of eigenvalues;
write(hunit)evecr(1:NGdof,1:NGdof) ! reals    ; real      part of eigenvalues; only if Ldvr=NGdof;
write(hunit)eveci(1:NGdof,1:NGdof) ! reals    ; imaginary part of eigenvalues; only if Ldvi=NGdof;
close(hunit)

```

5. The eigenvectors are saved in columns of `evecr`, `eveci`, as described by the NAG documentation for [NAG: F02EBF](#).