Table of transverse vector spherical harmonics, from Ref. [10]. Note that

$$\mathbf{Y}^E_{j-m} = (-1)^m \mathbf{Y}^{E^*}_{jm}$$

and

$$\mathbf{Y}^M_{j-m} = (-1)^{m+1} \mathbf{Y}^{M^*}_{jm}.$$

Mathews also states that, to within a normalization constant, Morse & Feschbach's $\mathbf{B}_{mj}$ and $\mathbf{C}_{mj}$ are $\mathbf{Y}^E_{jm}$ and $\mathbf{Y}^M_{jm}$. Also Jackson's $\mathbf{X}_{jm}$ is the same as $\mathbf{Y}^M_{jm}$. Finally,

$$\hat{r} \times \mathbf{Y}^M_{jm} = i \mathbf{Y}^E_{jm}$$

and

$$\hat{r} \times \mathbf{Y}^E_{jm} = i \mathbf{Y}^M_{jm}.$$

			$\mathbf{Y}^{E^*}_{jm}$		$\mathbf{Y}^M_{jm}$	
$\underline{j}$	$\underline{m}$	$\underline{factor}$	$\underline{\hat{\theta}}$	$\underline{\hat{\phi}}$	$\underline{\hat{\theta}}$	$\underline{\hat{\phi}}$
1	1	$\sqrt{\frac{3}{16\pi}}e^{i\phi}$	$-\cos\theta$	$-i$	1	$i\cos\theta$
1	0	$\sqrt{\frac{3}{8\pi}}\sin\theta$	-1	0	0	i
1	-1	$\sqrt{\frac{3}{16\pi}}e^{-i\phi}$	$\cos\theta$	$-i$	1	$-i\cos\theta$
2	2	$\sqrt{\frac{5}{16\pi}}\sin\theta e^{2i\phi}$	$\cos\theta$	i	-1	$-i\cos\theta$
2	1	$\sqrt{\frac{5}{16\pi}}e^{i\phi}$	$1-2\cos^2\theta$	$-i\cos\theta$	$\cos\theta$	$i(2\cos^2\theta-1)$
2	0	$\sqrt{\frac{15}{8\pi}}\sin\theta$	$-\cos\theta$	0	0	$i\cos\theta$
2	-1	$\sqrt{\frac{5}{16\pi}}e^{-i\phi}$	$2\cos^2\theta-1$	$-i\cos\theta$	$\cos\theta$	$i(1-2\cos^2\theta)$
2	-2	$\sqrt{\frac{5}{16\pi}}\sin\theta e^{-2i\phi}$	$\cos\theta$	$-i$	1	$-i\cos\theta$
3	3	$\sqrt{\frac{105}{256\pi}}\sin^2\theta e^{3i\phi}$	$-\cos\theta$	$-i$	1	$i\cos\theta$
3	2	$\sqrt{\frac{35}{128\pi}}\sin\theta e^{2i\phi}$	$3\cos^2\theta-1$	$2i\cos\theta$	$-2\cos\theta$	$i(1-3\cos^2\theta)$
3	1	$\sqrt{\frac{7}{256\pi}}e^{i\phi}$	$\cos\theta(11-15\cos^2\theta)$	$i(1-5\cos^2\theta)$	$5\cos^2\theta-1$	$i\cos\theta(15\cos^2\theta-11)$
3	0	$\sqrt{\frac{21}{64\pi}}\sin\theta$	$1-5\cos^2\theta$	0	0	$i(5\cos^2\theta-1)$
3	-1	$\sqrt{\frac{7}{256\pi}}e^{-i\phi}$	$\cos\theta(15\cos^2\theta-11)$	$i(1-5\cos^2\theta)$	$5\cos^2\theta-1$	$i\cos\theta(11-15\cos^2\theta)$
3	-2	$\sqrt{\frac{35}{128\pi}}\sin\theta e^{-2i\phi}$	$3\cos^2\theta-1$	$-2i\cos\theta$	$2\cos\theta$	$i(1-3\cos^2\theta)$
3	-3	$\sqrt{\frac{105}{256\pi}}\sin^2\theta e^{-3i\phi}$	$\cos\theta$	$-i$	1	$-i\cos\theta$