Appendix B. Coefficients occuring in the linearized equations (59) (66), (68), and (69)

$$
\begin{aligned}
a_{11} &= -\epsilon\sqrt{T\,'}X_* h_3 \\
a_{12} &= c_1 - 2\theta_{\mathrm{w}}\epsilon\sqrt{T\,'}h_3 \\
a_{13} &= \theta_{\mathrm{w}}^2\epsilon\sqrt{T\,'}h_3 + \frac{\theta_{\mathrm{w}}\sin\phi\,\nu X_* f_2}{V}\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu} \\
a_{14} &= \frac{12\epsilon\sqrt{T\,'}h_2'}{X_*} \\
a_{15} &= -\frac{6\theta_{\mathrm{w}}\epsilon\sqrt{T\,'}h_2'}{X_*} + \frac{\nu}{V}(\alpha_0 - \alpha_1 + \sin\phi\,(f_0 - f_1 + \theta_{\mathrm{w}}^2 f_2))\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu} \\
a_{16} &= \frac{6\epsilon\sqrt{T\,'}h_2'}{{X_*}^2}(V\theta_{\mathrm{w}} - 2\langle U\rangle) + \frac{\nu}{X_*}(\alpha_0 - \alpha_1 + \sin\phi\,(f_0 - f_1 + {\theta_{\mathrm{w}}}^2 f_2))\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu} \\
a_{17} &= \frac{6\epsilon\sqrt{T\,'}h_2'}{X_*}(2\langle U\rangle - V\theta_{\mathrm{w}}) + (\sigma\,'_c + 2\nu\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu})(\alpha_1 - \alpha_0 \\
&\quad + \sin\phi\,(f_1 - f_0 - \theta_{\mathrm{w}}^2 f_2)) + \theta_{\mathrm{w}}^2\sin\phi\,\nu f_2\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu} \\
b_{11} &= -\epsilon\sqrt{T\,'}X_* h_2' \\
b_{12} &= -\theta_{\mathrm{w}}\epsilon\sqrt{T\,'}h_2' - \frac{\epsilon\,T\,'\nu X_*}{V}\frac{\mathrm{d}h_1}{\mathrm{d}\nu} - \frac{\nu X_*}{V}(\overline{\alpha} - \sin\phi\,\overline{f})\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu} + c_1 \\
b_{13} &= \epsilon X_* h_1 \\
b_{14} &= -\frac{8\theta_{\mathrm{w}}\epsilon\sqrt{T\,'}h_2'}{X_*} \\
b_{15} &= \frac{5{\theta_{\mathrm{w}}}^2\epsilon\sqrt{T\,'}h_2'}{X_*} + \frac{\theta_{\mathrm{w}}\nu}{V}(\alpha_1 - \overline{\alpha} + \sin\phi\,(f_1 + \overline{f}))\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu} - \frac{c_1}{V^2} \\
b_{16} &= 0 \\
b_{17} &= \frac{\theta_{\mathrm{w}}\epsilon\sqrt{T\,'}h_2'}{{X_*}^2}(8\langle U\rangle - 5V\,\theta_{\mathrm{w}}) + \frac{\theta_{\mathrm{w}}\nu}{X_*}(\alpha_1 - \overline{\alpha} + \sin\phi\,(\overline{f} + f_1))\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu} \\
b_{18} &= -\theta_{\mathrm{w}}\epsilon T\,'\nu\frac{\mathrm{d}h_1}{\mathrm{d}\nu} + \frac{\theta_{\mathrm{w}}\sqrt{T\,'}h_2'}{X_*}(5V\,\theta_{\mathrm{w}} - 8\langle U\rangle) \\
&\quad + \theta_{\mathrm{w}}\sigma\,'_c(\overline{\alpha} - \alpha_1 - \sin\phi\,(\overline{f} + f_1))
\end{aligned}
$$

$$
\begin{aligned}
& +\theta_{\mathrm{w}}\nu\frac{\mathrm{d}\sigma_c'}{\mathrm{d}\nu}(\overline{\alpha}-2\alpha_1-\sin\phi\,(\overline{f}+2f_1))+\frac{2c_1}{V} \\
c_{11} &= -\epsilon\sqrt{T'}X_*h_4 \\
c_{12} &= -\theta_{\mathrm{w}}\epsilon\sqrt{T'}h_4+\frac{3}{2}c_1 \\
c_{13} &= \frac{16\sqrt{T'}h_3}{105}(-16X_*\frac{\mathrm{d}\langle U\rangle}{\mathrm{d}\bar{Y}}+X_*\theta_{\mathrm{w}}\frac{\mathrm{d}V}{\mathrm{d}\bar{Y}}+\theta_{\mathrm{w}}(11V\,\theta_{\mathrm{w}}-8\langle U\rangle) \\
c_{14} &= T'X_*h_1-2\sqrt{T'}(\bar{h}_2V\,\theta_{\mathrm{w}}+X_*h_2'\frac{\mathrm{d}V}{\mathrm{d}\bar{Y}}) \\
& +\frac{2\theta_{\mathrm{w}}\sqrt{T'}h_3}{105}(8X_*\frac{\mathrm{d}\langle U\rangle}{\mathrm{d}\bar{Y}}-11\theta_{\mathrm{w}}\,X_*\frac{\mathrm{d}V}{\mathrm{d}\bar{Y}}+\theta_{\mathrm{w}}(47V\,\theta_{\mathrm{w}}-80\langle U\rangle)) \\
c_{15} &= \frac{64\sqrt{T'}h_2'}{5X_*}(V\,\theta_{\mathrm{w}}-2\langle U\rangle)+\frac{\theta_{\mathrm{w}}^2\sqrt{T'}h_3}{105X_*}(928V\,\theta_{\mathrm{w}}-1408\langle U\rangle) \\
c_{16} &= \theta_{\mathrm{w}}T'h_1-T'\nu(\theta_{\mathrm{w}}\frac{\mathrm{d}h_1}{\mathrm{d}\nu}+\frac{\sqrt{T'}X_*}{V}\frac{\mathrm{d}h_6}{\mathrm{d}\nu}) \\
& +\frac{\theta_{\mathrm{w}}\sqrt{T'}h_2'}{5X_*}(64\langle U\rangle-42V\,\theta_{\mathrm{w}})+\frac{{\theta_{\mathrm{w}}}^3\sqrt{T'}h_3}{105X_*}(928\langle U\rangle-646V\,\theta_{\mathrm{w}}) \\
c_{17} &= h_1V\,\theta_{\mathrm{w}}+\frac{3}{2}\sqrt{T'}X_*h_6 \\
c_{18} &= -\frac{\theta_{\mathrm{w}}T'V\nu}{X_*}\frac{\mathrm{d}h_1}{\mathrm{d}\nu}+T'^{3/2}(h_6-\nu\frac{\mathrm{d}h_6}{\mathrm{d}\nu}) \\
& +\frac{\sqrt{T'}h_2'}{5{X_*}^2}(64\langle U\rangle(\langle U\rangle-V\,\theta_{\mathrm{w}})+21(V\,\theta_{\mathrm{w}})^2) \\
& +\frac{{\theta_{\mathrm{w}}}^2\sqrt{T'}h_3}{105{X_*}^2}(704\langle U\rangle^2-928\langle U\rangle V\,\theta_{\mathrm{w}}+323(V\,\theta_{\mathrm{w}})^2) \\
c_{19} &= \frac{\sqrt{T'}X_*h_3}{105}\left(128\left(\frac{\mathrm{d}\langle U\rangle}{\mathrm{d}\bar{Y}}\right)^2+11\left(\theta_{\mathrm{w}}\frac{\mathrm{d}V}{\mathrm{d}\bar{Y}}\right)^2\right. \\
& \left.-16\,\theta_{\mathrm{w}}\frac{\mathrm{d}\langle U\rangle}{\mathrm{d}\bar{Y}}\frac{\mathrm{d}V}{\mathrm{d}\bar{Y}}\right)+\sqrt{T'}X_*h_2'\left(\frac{\mathrm{d}V}{\mathrm{d}\bar{Y}}\right)^2+\theta_{\mathrm{w}}T'V(2\nu\frac{\mathrm{d}h_1}{\mathrm{d}\nu}-h_1) \\
& +X_*T'^{3/2}(2\nu\frac{\mathrm{d}h_6}{\mathrm{d}\nu}-\frac{3}{2}h_6) \\
p_{11} &= -\frac{1}{V^2} \\
p_{12} &= \frac{2}{V} \\
a_{23} &= \epsilon\sqrt{T'}(\bar{h}_2+\frac{\theta_{\mathrm{w}}h_3}{V}(\langle U\rangle-V\,\theta_{\mathrm{w}}))+\frac{\theta_{\mathrm{w}}\sin\phi\,X_*f_2}{V}(\sigma_c'+\nu\frac{\mathrm{d}\sigma_c'}{\mathrm{d}\nu})
\end{aligned}
$$

$T'^{1/2}$ x16 , h , h num on small frac , h num x4 ⟨|⟩| x15 , h

$$
\begin{aligned}
a_{24} &= \epsilon\sqrt{T\,'}h_3(2\theta_{\mathrm{w}} - \frac{< U >}{V}) - \frac{\sin\phi\, X_* f_2 \sigma\,'_c}{V} \\
a_{25} &= \frac{4\epsilon\sqrt{T\,'}h_2'}{X_*} \\
a_{26} &= \frac{\epsilon\; T\,'\nu}{V}\frac{\mathrm{d}h_1}{\mathrm{d}\nu} + \frac{2\theta_{\mathrm{w}}^2 \sin\phi f_2}{V}\sigma\,'_c + \frac{\nu}{V}(\alpha_0 + \sin\phi f_0)\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu} \\
a_{27} &= \frac{-\epsilon\sqrt{T\,'}h_2'}{X_*} - \frac{\theta_{\mathrm{w}}\sin\phi f_2}{V}\left(2\sigma\,'_c - \nu\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu}\right) \\
a_{28} &= -\epsilon h_1 \\
a_{29} &= \frac{\epsilon T\,'\nu}{X_*}\frac{\mathrm{d}h_1}{\mathrm{d}\nu} + \frac{\epsilon\sqrt{T\,'}h_2'}{X_*^2}(V\,\theta_{\mathrm{w}} - 4 < U >) + \frac{\nu}{X_*}(\alpha_0 + \sin\phi(f_0 + \theta_{\mathrm{w}}^2 f_2))\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu} \\
a_{20} &= -2\epsilon T\,'\nu\frac{\mathrm{d}h_1}{\mathrm{d}\nu} + \frac{\epsilon\sqrt{T\,'}h_2'}{X_*}(4 < U > -V\,\theta_{\mathrm{w}}) - (\alpha_0 + \sin\phi(f_0 + \theta_{\mathrm{w}}^2 f_2))\sigma\,'_c \\
&\quad -(2\alpha_0 + \sin\phi(2f_0 + \theta_{\mathrm{w}}^2 f_2))\nu\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu} \\
b_{23} &= -\epsilon\sqrt{T\,'}\;\bar{h}_2 \\
b_{25} &= -\frac{\theta_{\mathrm{w}}\epsilon T\,'h_1}{V} - \frac{\theta_{\mathrm{w}}}{V}(\overline{\alpha} - \sin\phi\;\overline{f})\sigma\,'_c - \frac{c_1}{V^2} \\
b_{26} &= \frac{\epsilon T\,'}{V}(h_1 - \nu\frac{\mathrm{d}h_1}{\mathrm{d}\nu}) + \frac{(\overline{\alpha} - \sin\phi\overline{f})}{V}(\sigma\,'_c - \nu\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu}) \\
b_{27} &= \theta_{\mathrm{w}}\epsilon h_1 \\
b_{28} &= -\frac{\theta_{\mathrm{w}}\epsilon T\,'\nu}{X_*}\frac{\mathrm{d}h_1}{\mathrm{d}\nu} - \frac{\theta_{\mathrm{w}}\nu}{X_*}(\overline{\alpha} - \sin\phi\overline{f})\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu} \\
b_{29} &= \theta_{\mathrm{w}}\epsilon T\,'\nu\frac{\mathrm{d}h_1}{\mathrm{d}\nu} + \theta_{\mathrm{w}}(\sigma\,'_c + \nu\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu})(\overline{\alpha} - \sin\phi\;\overline{f}) + \frac{2c_1}{V} \\
c_{24} &= T\,'X_* h_1 - 2\sqrt{T\,'}(\bar{h}_2 V\,\theta_{\mathrm{w}} + X_* h_2'\frac{\mathrm{d}V}{\mathrm{d}\bar{Y}}) \\
c_{25} &= \frac{2\sqrt{T\,'}h_3}{105}(8X_*\frac{\mathrm{d} < U >}{\mathrm{d}\bar{Y}} - 11X_*\,\theta_{\mathrm{w}}\frac{\mathrm{d}V}{\mathrm{d}\bar{Y}} + \theta_{\mathrm{w}}(47V\,\theta_{\mathrm{w}} - 80 < U >)) \\
c_{27} &= -T\,'\nu(\theta_{\mathrm{w}}\frac{\mathrm{d}h_1}{\mathrm{d}\nu} + \frac{\sqrt{T\,'}X_*}{V}\frac{\mathrm{d}h_6}{\mathrm{d}\nu}) \\
c_{28} &= T\,'h_1 + \frac{\sqrt{T\,'}h_2'}{5X_*}(64 < U > -42V\,\theta_{\mathrm{w}}) + \frac{{\theta_{\mathrm{w}}}^2\sqrt{T\,'}h_3}{105X_*}(928 < U > -646V\,\theta_{\mathrm{w}}) \\
d_{21} &= -\epsilon\sqrt{T\,'}\bar{h}_2 \\
d_{22} &= \frac{8\epsilon\sqrt{T\,'}h_2'}{X_*}
\end{aligned}
$$

$$
\begin{aligned}
d_{23} &= -\frac{\epsilon T\,'\nu}{V}\frac{\mathrm{d}h_1}{\mathrm{d}\nu} - \frac{\nu}{V}(\alpha_1 + \sin\phi f_1)\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu} \\
d_{24} &= -\frac{5\epsilon\sqrt{T\,'}h_2'}{X_*} \\
d_{25} &= \epsilon h_1 \\
d_{26} &= -\frac{\epsilon T\,'\nu}{X_*}\frac{\mathrm{d}h_1}{\mathrm{d}\nu} + \frac{\epsilon\sqrt{T\,'}\,h_2'}{X_*^{\,2}}(5V\,\theta_{\mathrm{w}} - 8 < U >) - \frac{\nu}{X_*}(\alpha_1 + \sin\phi\, f_1)\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu} \\
d_{27} &= 2\epsilon T\,'\nu\frac{\mathrm{d}h_1}{\mathrm{d}\nu} + \frac{\epsilon\sqrt{T\,'}h_2'}{X_*}(8 < U > -5V\,\theta_{\mathrm{w}}) + (\alpha_1 + \sin\phi\, f_1)(\sigma\,'_c + 2\nu\frac{\mathrm{d}\sigma\,'_c}{\mathrm{d}\nu}) \\
p_{21} &= \frac{3}{2}c_1 \\
p_{22} &= \frac{T\,'\nu X_*}{V}(\frac{1}{V}\frac{\mathrm{d}h_1}{\mathrm{d}\nu} - \sqrt{T\,'}\frac{\mathrm{d}h_6}{\mathrm{d}\nu}) \\
p_{23} &= X_*(\frac{3}{2}\sqrt{T\,'}h_6 - \frac{h_1}{V}) \\
p_{24} &= T\,'^{\frac{3}{2}}(h_6 - \nu\frac{\mathrm{d}h_6}{\mathrm{d}\nu}) + \frac{T\,'}{V}(\nu\frac{\mathrm{d}h_1}{\mathrm{d}\nu} - h_1) - \frac{\sqrt{T\,'}h_2'}{V^{\,2}} \\
p_{25} &= \frac{T\,'X_*}{V}(h_1 - 2\nu\frac{\mathrm{d}h_1}{\mathrm{d}\nu}) + T\,'^{3/2}X_*(2\nu\frac{\mathrm{d}h_6}{\mathrm{d}\nu} - \frac{3}{2}h_6)
\end{aligned}
$$

TABLE 2. Coefficients occuring in the linearized equations (62)–(64), and (66). The constants a_{1j}–d_{2j} are defined in Appendix B.

$$g_{21} = a_{11} \qquad g_{22} = -\frac{a_{24}d_{21}}{d_{24}} \qquad g_{23} = a_{12} - \frac{a_{24}d_{22}}{d_{24}}$$

$$g_{24} = a_{23} - \frac{d_{23}a_{24} + d_{21}a_{27}}{d_{24}} \qquad g_{25} = -\frac{a_{24}d_{25}}{d_{24}} \qquad g_{26} = -\frac{a_{24}d_{26}}{d_{24}}$$

$$g_{27} = a_{25} - \frac{a_{27}d_{22}}{d_{24}} \qquad g_{28} = a_{26} - \frac{a_{27}d_{23}}{d_{24}} \qquad g_{29} = a_{28} - \frac{a_{27}d_{25}}{d_{24}}$$

$$g_{20} = a_{29} - \frac{a_{27}d_{26}}{d_{24}} \qquad h_{21} = 1 + \frac{a_{27} + k\,'a_{24}}{d_{24}} \qquad h_{22} = a_{20} - \frac{a_{27}d_{27}}{d_{24}}$$

$$l_{21} = b_{11} - \frac{b_{23}d_{21}}{d_{24}} \qquad l_{22} = -\frac{b_{23}d_{22}}{d_{24}} \qquad l_{23} = b_{12} - \frac{b_{26}d_{21} + b_{23}d_{23}}{d_{24}}$$

$$l_{24} = b_{13} - \frac{b_{23}d_{25}}{d_{24}} \qquad l_{25} = -\frac{b_{23}d_{26}}{d_{24}} \qquad l_{26} = -\frac{b_{26}d_{22}}{d_{24}}$$

$$l_{27} = b_{25} - \frac{b_{26}d_{23}}{d_{24}} \qquad l_{28} = b_{27} - \frac{b_{26}d_{25}}{d_{24}} \qquad l_{29} = b_{28} - \frac{b_{26}d_{26}}{d_{24}}$$

$$l_{20} = \frac{b_{26} + k\,'b_{23}}{d_{24}} - \theta_{\mathrm{w}} \qquad h_{23} = b_{29} - \frac{b_{26}d_{27}}{d_{24}}$$

insert rest of table that appears on p 54

TABLE 2 (continued)

$m_{21} = -\dfrac{c_{25}d_{21}}{d_{24}}$	$m_{22} = c_{11}$	$m_{23} = c_{13} - \dfrac{c_{25}d_{22}}{d_{24}}$
$m_{24} = c_{24} - \dfrac{c_{25}d_{23} + c_{28}d_{21}}{d_{24}}$	$m_{25} = c_{12} - \dfrac{c_{25}d_{25}}{d_{24}}$	$m_{26} = -\dfrac{c_{25}d_{26}}{d_{24}}$
$m_{27} = c_{15} - \dfrac{c_{28}d_{22}}{d_{24}}$	$m_{28} = c_{27} - \dfrac{c_{28}d_{23}}{d_{24}}$	$m_{29} = c_{17} - \dfrac{c_{28}d_{25}}{d_{24}}$
$m_{20} = c_{18} - \dfrac{c_{28}d_{26}}{d_{24}}$	$h_{24} = \dfrac{c_{28} + k\,'c_{25}}{d_{24}}$	$h_{25} = c_{19} - \dfrac{c_{28}d_{27}}{d_{24}}$
$n_{21} = \dfrac{d_{21}}{Vd_{24}}$	$n_{22} = \dfrac{d_{22}}{Vd_{24}}$	$n_{23} = \dfrac{\theta_{\mathrm{w}}}{V} + \dfrac{d_{23}}{Vd_{24}}$
$n_{24} = \dfrac{d_{25}}{Vd_{24}}$	$n_{25} = \dfrac{d_{26}}{Vd_{24}}$	$n_{26} = -\dfrac{1}{Vd_{24}}$
$n_{27} = -\theta_{\mathrm{w}} + \dfrac{d_{27}}{Vd_{24}}$		

Combine with table on p 53