SUPPLEMENTAL DATA

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Erratum for "Semiexplicit Unconditionally Stable Time Integration for Dynamic Analysis Based on Composite Scheme" by Amir Hossein Namadchi, Farhang Fattahi, and Javad Alamatian

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The correct equations are as follows:

$D_{n+1} = D_n + \alpha_1 \Delta t \dot{D}_n + \alpha_2 \Delta t^2 \ddot{D}_n$	(2)
$\dot{D}_{n+1} = \dot{D}_n + \beta_1 \Delta t \ddot{D}_n + \beta_2 \Delta t \ddot{D}_{n+1}$	(3)
$\delta_{n+1} = \frac{k_{n+1}}{k_0}$	(8)
$\left\{\tilde{\mathbf{D}}\right\}_{n+1} = \left[\mathbf{A}\right]_{n+1} \left\{\tilde{\mathbf{D}}\right\}_n$	(10)
$[\mathbf{A}]_{n+1} = \frac{-1}{1+2\beta_2\zeta\Omega_0} \begin{pmatrix} -(1+2\beta_2\zeta\Omega_0) & -\alpha_1(1+2\beta_2\zeta\Omega_0) & -\alpha_2(1+2\beta_2\zeta\Omega_0) \\ \beta_2\delta_{n+1}\Omega_0^2 & \alpha_1\beta_2\delta_{n+1}\Omega_0^2 - 1 & \alpha_2\beta_2\delta_{n+1}\Omega_0^2 - \beta_1 \\ \delta_{n+1}\Omega_0^2 & \alpha_1\delta_{n+1}\Omega_0^2 + 2\zeta\Omega_0 & \alpha_2\delta_{n+1}\Omega_0^2 + 2\beta_1\zeta\Omega_0 \end{pmatrix}$	(11)
$\left\|\left[\mathbf{A}\right]_{n+1} - \lambda\left[\mathbf{I}\right]\right\| = 0$	(12)
$\lambda^3 - A_1\lambda^2 + A_2\lambda - A_3 = 0$	(13)
$\mu_{n+1} = \left\|1 - \delta_{n+1} \pm i\sqrt{\delta_{n+1}(\delta_{n+1} - 1)}\right\| \qquad \delta_{n+1} \le 1$	(17)
$D_{n+1} = e^{-\bar{\zeta}_{n+1}\varpi_{n+1}t_{n+1}}(c_1 \cos\varpi_{n+1}t_{n+1} + c_2 \sin\varpi_{n+1}t_{n+1})$	(18)
$PE_{n+1} = \frac{\bar{T}_{n+1} - T_{n+1}}{T_{n+1}} = \frac{\Omega_0\sqrt{\delta_{n+1}}}{\varphi_{n+1}} - 1$	(21)
$\left[\boldsymbol{\alpha}_1\right] = \left[\mathbf{Q}_1\right]^{-1}\left(144\left[\mathbf{I}\right] - 5\left[\mathbf{W}\right] + 12\left[\mathbf{Z}\right]^2 + \left[\mathbf{Z}\right]\left(84\left[\mathbf{I}\right] + \left[\mathbf{W}\right]\right)\right)$	(25)
$\left[\boldsymbol{\alpha}_2\right] = \left[\mathbf{Q}_1\right]^{-1}\left(72\left[\mathbf{I}\right] + 12\left[\mathbf{Z}\right] + \left[\mathbf{W}\right]\right)$	(26)
$\left[\boldsymbol{\beta}_1\right] = 72\left[\mathbf{Q}_2\right]^{-1}$	(27)
$\left[\boldsymbol{\beta}_2\right] = \left[\mathbf{Q}_2\right]^{-1}\left(72\left[\mathbf{I}\right] + 12\left[\mathbf{Z}\right] + \left[\mathbf{W}\right]\right)$	(28)
$\left[\mathbf{W}\right] = \Delta t^2\left[\mathbf{M}\right]^{-1}\left[\mathbf{K}\right]_0$	(29)
$\left[\mathbf{Z}\right] = \Delta t\left[\mathbf{M}\right]^{-1}\left[\mathbf{C}\right]$	(30)
$\left[\mathbf{Q}_1\right] = \left(9\left[\mathbf{I}\right] + 3\left[\mathbf{Z}\right] + \left[\mathbf{W}\right]\right)\left(16\left[\mathbf{I}\right] + 4\left[\mathbf{Z}\right] + \left[\mathbf{W}\right]\right)$	(31)
$\left[\mathbf{Q}_2\right] = 144\left[\mathbf{I}\right] + 12\left[\mathbf{Z}\right] - 5\left[\mathbf{W}\right]$	(32)

$$\{\mathbf{D}\}_{n+1} = \{\mathbf{D}\}_n + \Delta t\,[\boldsymbol{\alpha}_1]\{\dot{\mathbf{D}}\}_n + \Delta t^2\,[\boldsymbol{\alpha}_2]\{\ddot{\mathbf{D}}\}_n \tag{33}$$

$$\left([\mathbf{M}] + \Delta t\,[\mathbf{C}][\boldsymbol{\beta}_2]\right)\{\ddot{\mathbf{D}}\}_{n+1} = \left(\{\mathbf{P}\}_{n+1} - \{\mathbf{f}\}_{n+1} - [\mathbf{C}]\{\dot{\mathbf{D}}\}_n - \Delta t\,[\mathbf{C}][\boldsymbol{\beta}_1]\{\ddot{\mathbf{D}}\}_n\right) \tag{34}$$

$$\{\dot{\mathbf{D}}\}_{n+1} = \{\dot{\mathbf{D}}\}_n + \Delta t\,[\boldsymbol{\beta}_1]\{\ddot{\mathbf{D}}\}_n + \Delta t\,[\boldsymbol{\beta}_2]\{\ddot{\mathbf{D}}\}_{n+1} \tag{35}$$

$$A_{33} = \frac{\delta_{1+n}(144 - 120\zeta\Omega_0 - 47\Omega_0^2)}{(9 + 6\zeta\Omega_0 + \Omega_0^2)(16 + 8\zeta\Omega_0 + \Omega_0^2)} - \frac{\delta_{1+n}(144 - 120\zeta\Omega_0 - 5\Omega_0^2) + 144\zeta\Omega_0}{144 + 2\zeta\Omega_0(84 + \Omega_0^2) + 48\zeta^2\Omega_0^2 - 5\Omega_0^2} \tag{47}$$

$$[\mathbf{A}] = \frac{1}{(9 + 6\zeta\Omega + \Omega^2)(16 + 8\zeta\Omega + \Omega^2)} \times \begin{pmatrix} 144 + 168\zeta\Omega + (48\zeta^2 - 19)\Omega^2 - 2\zeta\Omega^3 & 144 + 80\zeta\Omega + (16\zeta^2 - 5)\Omega^2 & 8\zeta\Omega + 28 \\ \Omega^2(\Omega^2 - 24\zeta\Omega - 96) & 144 - 47\Omega^2 - 8\zeta\Omega(3 + \Omega^2) & 48 - 4\Omega^2 \\ \Omega^2\left(19\Omega^2 + 24\zeta\Omega - 144\right) & -288\zeta\Omega + 48(\zeta^2 - 3)\Omega^2 + 14\zeta\Omega^3 + 5\Omega^4 & -4\Omega(24\zeta + 7\Omega) \end{pmatrix} \tag{48}$$

$$\begin{Bmatrix} D_{n+1} \\ \Delta t\dot{D}_{n+1} \end{Bmatrix} = \frac{1}{1 + 2\zeta\Omega\beta_2} \begin{pmatrix} (1 - \Omega^2\alpha_2)(1 + 2\zeta\Omega\beta_2) & (\alpha_1 - 2\zeta\Omega\alpha_2)(1 + 2\zeta\Omega\beta_2) \\ \Omega^2\left((\Omega^2\alpha_2 - 1)\beta_2 - \beta_1\right) & 1 - 2\zeta\Omega\beta_1 + \Omega^2(2\zeta\Omega\alpha_2 - \alpha_1)\beta_2 \end{pmatrix} \begin{Bmatrix} D_n \\ \Delta t\dot{D}_n \end{Bmatrix} \tag{49}$$

$$\begin{Bmatrix} D_{n+1} \\ \Delta t\dot{D}_{n+1} \end{Bmatrix} = \frac{1}{(9 + 6\zeta\Omega + \Omega^2)(16 + 8\zeta\Omega + \Omega^2)} \times \begin{pmatrix} 144 + 168\zeta\Omega + (48\zeta^2 - 47)\Omega^2 - 10\zeta\Omega^3 & 144 + 24\zeta\Omega - 5\Omega^2 \\ \Omega^2(5\Omega^2 - 24\zeta\Omega - 144) & -47\Omega^2 - 120\zeta\Omega + 144 \end{pmatrix} \begin{Bmatrix} D_n \\ \Delta t\dot{D}_n \end{Bmatrix} \tag{50}$$

$$N\left([\hat{\boldsymbol{\alpha}}_1]\right) = 144[\mathbf{I}] - 5\left[\hat{\boldsymbol{\Omega}}\right]_0^2 + 48\left(\left[\hat{\boldsymbol{\xi}}\right]\left[\hat{\boldsymbol{\Omega}}\right]_0\right)^2 + 2\left[\hat{\boldsymbol{\xi}}\right]\left[\hat{\boldsymbol{\Omega}}\right]_0\left(84[\mathbf{I}] + \left[\hat{\boldsymbol{\Omega}}\right]_0^2\right)$$

$$D\left([\hat{\boldsymbol{\alpha}}_1]\right) = \left(9[\mathbf{I}] + 6\left[\hat{\boldsymbol{\xi}}\right]\left[\hat{\boldsymbol{\Omega}}\right]_0 + \left[\hat{\boldsymbol{\Omega}}\right]_0^2\right)\left(16[\mathbf{I}] + 8\left[\hat{\boldsymbol{\xi}}\right]\left[\hat{\boldsymbol{\Omega}}\right]_0 + \left[\hat{\boldsymbol{\Omega}}\right]_0^2\right) \tag{52}$$

$$\left[\hat{\mathbf{M}}\right]\{\ddot{\mathbf{Y}}\} + \left[\hat{\mathbf{C}}\right]\{\dot{\mathbf{Y}}\} + \left[\hat{\mathbf{K}}\right]_0\{\mathbf{Y}\} = \{\mathbf{0}\} \tag{53}$$

$$\{\mathbf{Y}\}_{n+1} = \{\mathbf{Y}\}_n + \Delta t\,[\hat{\boldsymbol{\alpha}}_1]\{\dot{\mathbf{Y}}\}_n + \Delta t^2\,[\hat{\boldsymbol{\alpha}}_2]\{\ddot{\mathbf{Y}}\}_n \tag{61}$$

$$[\boldsymbol{\alpha}_1] = [\boldsymbol{\Phi}]\left(D\left([\hat{\boldsymbol{\alpha}}_1]\right)^{-1} N\left([\hat{\boldsymbol{\alpha}}_1]\right)\right)[\boldsymbol{\Phi}]^{-1} = \left([\boldsymbol{\Phi}]D\left([\hat{\boldsymbol{\alpha}}_1]\right)^{-1}[\boldsymbol{\Phi}]^{-1}\right)\left([\boldsymbol{\Phi}]N\left([\hat{\boldsymbol{\alpha}}_1]\right)[\boldsymbol{\Phi}]^{-1}\right) \tag{65}$$

$$N\left([\hat{\boldsymbol{\alpha}}_2]\right) = 72[\mathbf{I}] + 24\left[\hat{\boldsymbol{\xi}}\right]\left[\hat{\boldsymbol{\Omega}}\right]_0 + \left[\hat{\boldsymbol{\Omega}}\right]_0^2 = 72[\mathbf{I}] + 12\Delta t\,[\boldsymbol{\Phi}]^{-1}[\mathbf{M}]^{-1}[\mathbf{C}][\boldsymbol{\Phi}] + \Delta t^2\,[\boldsymbol{\Phi}]^{-1}[\mathbf{M}]^{-1}[\mathbf{K}]_0[\boldsymbol{\Phi}] \tag{67}$$

$$[\boldsymbol{\alpha}_2]=\left[\left(9[\mathbf{I}]+3\Delta t[\mathbf{M}]^{-1}[\mathbf{C}]+\Delta t^2[\mathbf{M}]^{-1}[\mathbf{K}]_0\right)\left(16[\mathbf{I}]+4\Delta t[\mathbf{M}]^{-1}[\mathbf{C}]+\Delta t^2[\mathbf{M}]^{-1}[\mathbf{K}]_0\right)\right]^{-1}\cdot$$ $$\left[72[\mathbf{I}]+12\Delta t[\mathbf{M}]^{-1}[\mathbf{C}]+\Delta t^2[\mathbf{M}]^{-1}[\mathbf{K}]_0\right]$$	(69)
$$D\left(\left[\hat{\boldsymbol{\beta}}_1\right]\right)=D\left(\left[\hat{\boldsymbol{\beta}}_2\right]\right)=144[\mathbf{I}]+24\left[\hat{\boldsymbol{\zeta}}\right]\left[\hat{\boldsymbol{\Omega}}\right]_0-5\left[\hat{\boldsymbol{\Omega}}\right]_0^2=$$ $$144[\mathbf{I}]+12\Delta t[\boldsymbol{\Phi}]^{-1}[\mathbf{M}]^{-1}[\mathbf{C}][\boldsymbol{\Phi}]-5\Delta t^2[\boldsymbol{\Phi}]^{-1}[\mathbf{M}]^{-1}[\mathbf{K}]_0[\boldsymbol{\Phi}]$$	(72)