FORM TO SPECIFY INPUT DATA FOR
TEMPERATURE PERTURBATION MODEL TWAVE[1]

This model represents the temperature perturbation profile at any latitude by a sequence of three linear segments that are smoothly joined by hyperbolic functions. It is equivalent to the TTANH6 temperature model at each latitude. Each profile gives a transition from a bottom region having constant specified slope to an upper region that has zero temperature perturbation. The height of the transition between these two regions has a wavelike variation of specified amplitude and wavenumber. The height jump at the transition and temperature jump at the transition are specified below.

$$T = T_{\text{background}}(r,\theta,\phi) + T_0 + \frac{c_1}{2}(z - z_0) + \sum_{i=1}^{2} \delta_i \left(\frac{c_{i+1} - c_i}{2}\right) \ln\left\{\frac{\cosh\left(\frac{z - z_i}{\delta_i}\right)}{\cosh\left(\frac{z_i - z_0}{\delta_i}\right)}\right\} + \frac{c_3}{2}(z - z_0)$$

$$\frac{\partial T}{\partial r} = \frac{\partial}{\partial r} T_{\text{background}}(r,\theta,\phi) + c_1 + \sum_{i=1}^{2} \left(\frac{c_{i+1} - c_i}{2}\right) \left\{\tanh\left(\frac{z - z_i}{\delta_i}\right) + 1\right\}$$

$$c_i = (T_i - T_{i-1})/(z_i - z_{i-1}) \ .$$

$T_{\text{background}}(r,\theta,\phi)$ is the background temperature, $z = r - r_e$, where r_e is the Earth radius, and r is the radial coordinate of the ray point. Thus, δ_i is the half-thickness of a region centered at approximately z_i km, in which dT/dz changes from c_i to c_{i+1}.
Specify–
the model check for TWAVE = 6.0 (w225)
the input data-format code = _____ (w226)
an input data-set identification number = _____ (w227)
an 80-character description of the model with parameters:

Average height of the transition, h_0 = _____ km, m (w228)
Height jump at the transition, ΔH = _____ km, m (w229)
Temperature jump at the transition, ΔT = _____ Kelvin (w230)
Height over which the profile changes slope, δ_1 = _____ km, m (w231)
Height over which the profile changes slope, δ_2 = _____ km, m (w232)
Average slope of the bottom segment of the profile, $\bar{c}_1$ = _____ Kelvin/km (w233)
Amplitude of the wave, A = _____, km, m (w234)
Wavenumber of the wave, k_{grav0} = _____ km^{-1}, wavelength in km (w235)
Phase of the wave, Φ = _____ rad, deg (w236)
and the profile values:[2]

i	z_i (km,m)	T_i (Kelvin)	δ_i (km,m)
0	0.0	$-\Delta T + (z_0 - h_0)\bar{c}_1$	0.0
1	$h_0 - \Delta H/2 + A\cos(k_{\text{grav}\theta}(\frac{\pi}{2} - \theta) + \Phi)$	$-\Delta T$	δ_1
2	$h_0 + \Delta H/2 + A\cos(k_{\text{grav}\theta}(\frac{\pi}{2} - \theta) + \Phi)$	0.0	δ_2
3	1000.0	0.0	0.0

[1]OTHER MODELS REQUIRED: Any background temperature model. SUBROUTINE FTANH3, SUBROUTINE GAMANG, and FUNCTION ALCOSH.

[2]θ is the colatitude. $k_{\text{grav}\theta} = r_e k_{\text{grav0}}$.