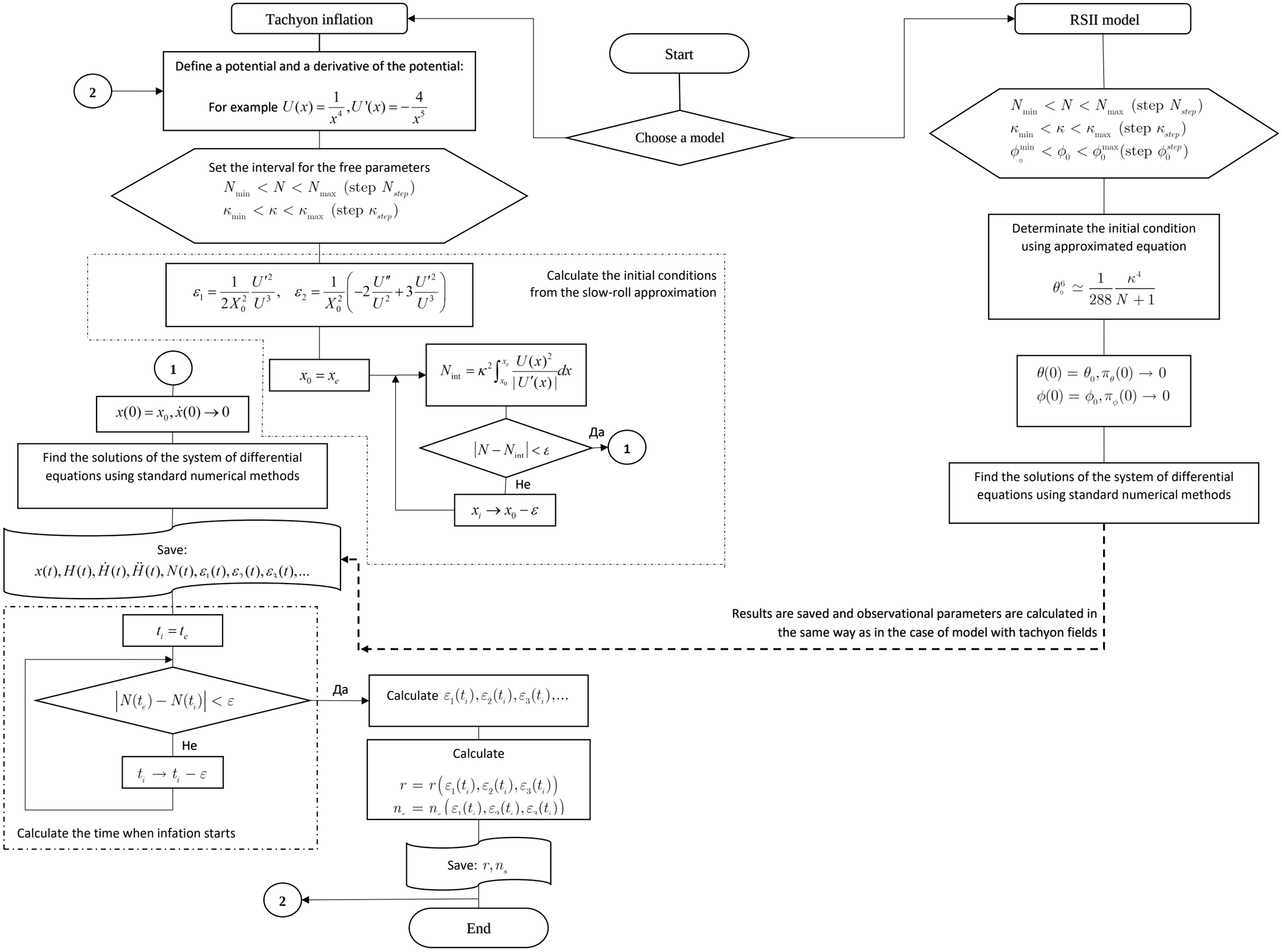
Start
Choose a model
Tachyon inflation
RSII model
2
Define a potential and a derivative of the potential:
For example $U(x)=\frac{1}{x^4}, U'(x)=-\frac{4}{x^5}$
Set the interval for the free parameters
$N_{\min} < N < N_{\max}$ (step N_{step})
$\kappa_{\min} < \kappa < \kappa_{\max}$ (step κ_{step})
$\varepsilon_1 = \frac{1}{2X_0^2}\frac{U'^2}{U^3}, \quad \varepsilon_2 = \frac{1}{X_0^2}\left(-2\frac{U''}{U^2}+3\frac{U'^2}{U^3}\right)$
Calculate the initial conditions from the slow-roll approximation
$x_0 = x_e$
$N_{\text{int}} = \kappa^2 \int_{x_0}^{x_e} \frac{U(x)^2}{|U'(x)|}dx$
$|N - N_{\text{int}}| < \varepsilon$
Да
1
He
$x_i \to x_0 - \varepsilon$
1
$x(0) = x_0, \dot{x}(0) \to 0$
Find the solutions of the system of differential equations using standard numerical methods
Save:
$x(t), H(t), \dot{H}(t), \ddot{H}(t), N(t), \varepsilon_1(t), \varepsilon_2(t), \varepsilon_3(t), \ldots$
$t_i = t_e$
$|N(t_e) - N(t_i)| < \varepsilon$
Да
He
$t_i \to t_i - \varepsilon$
Calculate the time when infation starts
Calculate $\varepsilon_1(t_i), \varepsilon_2(t_i), \varepsilon_3(t_i), \ldots$
Calculate
$r = r(\varepsilon_1(t_i), \varepsilon_2(t_i), \varepsilon_3(t_i))$
$n_s = n_s(\varepsilon_1(t_i), \varepsilon_2(t_i), \varepsilon_3(t_i))$
Save: r, n_s
2
End
$N_{\min} < N < N_{\max}$ (step N_{step})
$\kappa_{\min} < \kappa < \kappa_{\max}$ (step κ_{step})
$\phi_0^{\min} < \phi_0 < \phi_0^{\max}$ (step ϕ_0^{step})
Determinate the initial condition using approximated equation
$\theta_0^6 \simeq \frac{1}{288}\frac{\kappa^4}{N+1}$
$\theta(0) = \theta_0, \pi_\theta(0) \to 0$
$\phi(0) = \phi_0, \pi_\phi(0) \to 0$
Find the solutions of the system of differential equations using standard numerical methods
Results are saved and observational parameters are calculated in the same way as in the case of model with tachyon fields