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[ (%i1) kill(all);
  (%o0) done

[ (%i1) E12: 1/c^2*omega_0*phi+dot(omega,A) = 2* div(A);
  (%o1)  $\frac{\omega_0 \varphi}{c^2} + \text{dot}(\omega, A) = 2 \text{div}(A)$ 

[ (%i3) E12a: solve(E12, phi);
  E12b: solve(E12, omega_0);
  (%o2)  $[\varphi = -\frac{c^2 \text{dot}(\omega, A) - 2 \text{div}(A) c^2}{\omega_0}]$ 
  (%o3)  $[\omega_0 = -\frac{c^2 \text{dot}(\omega, A) - 2 \text{div}(A) c^2}{\varphi}]$ 

[ (%i4) E13a: E = -grad(phi) + omega*phi;
  (%o4)  $E = \omega \varphi - \text{grad}(\varphi)$ 

[ (%i5) E13b: E = -A_dot-omega_0*A;
  (%o5)  $E = -A \omega_0 - A_{\text{dot}}$ 

[ --> /*phi: rhs(first(E12a));*/;

[ (%i6) omega_0: rhs(first(E12b));
  (%o6)  $-\frac{c^2 \text{dot}(\omega, A) - 2 \text{div}(A) c^2}{\varphi}$ 

[ (%i7) ev(E13a);
  (%o7)  $E = \omega \varphi - \text{grad}(\varphi)$ 

[ (%i8) ev(E13b);
  (%o8)  $E = \frac{A (c^2 \text{dot}(\omega, A) - 2 \text{div}(A) c^2)}{\varphi} - A_{\text{dot}}$ 

[ equate both sides of (13)

[ (%i9) F1: factor(rhs(ev(E13a))*phi = ev(rhs(E13b))*phi)*(-1);
  (%o9)  $\varphi (\text{grad}(\varphi) - \omega \varphi) = A_{\text{dot}} \varphi - A c^2 \text{dot}(\omega, A) + 2 A \text{div}(A) c^2$ 

[ Diff. eq.

[ (%i10) depends(phi, x);
  (%o10)  $[\varphi(x)]$ 

[ (%i11) D1: phi(x)*diff(phi(x), x)-omega(x)*phi(x)^2+f(x)*phi(x)+g(x)=0;
  (%o11)  $\varphi(x) \left( \frac{d}{dx} \varphi(x) \right) - \omega(x) \varphi(x)^2 + f(x) \varphi(x) + g(x) = 0$ 

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(%i12) D2: expand(D1/phi(x));  
(%o12)  $\frac{d}{dx} \varphi(x) - \omega(x) \varphi(x) + \frac{g(x)}{\varphi(x)} + f(x) = 0$   
  
(%i13) ode2(D2, phi(x), x);  
(%o13) false
```