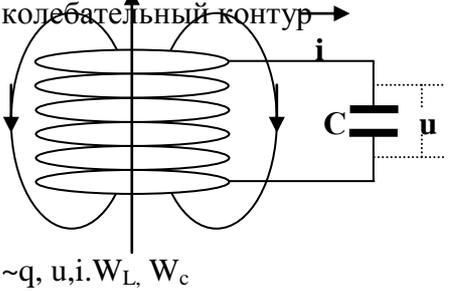
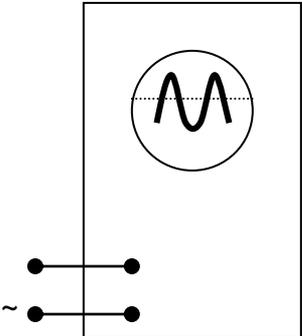
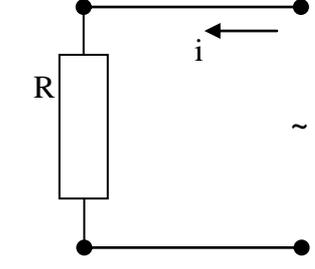
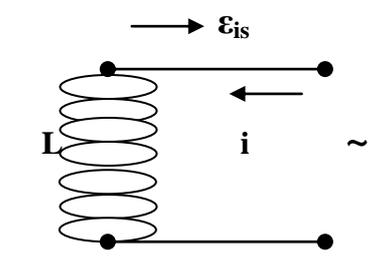
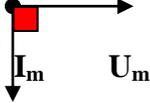
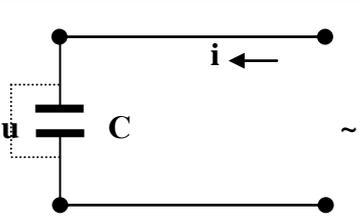
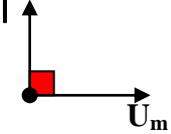
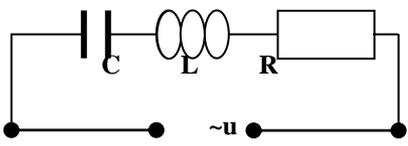
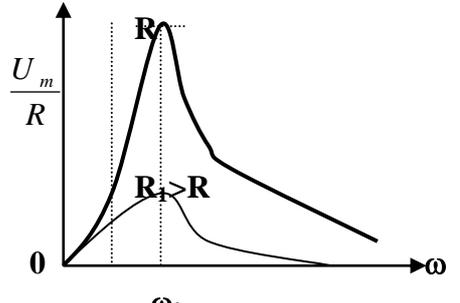
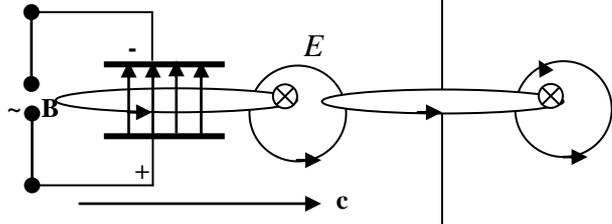
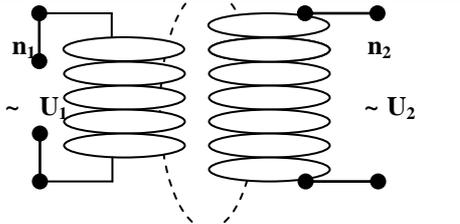
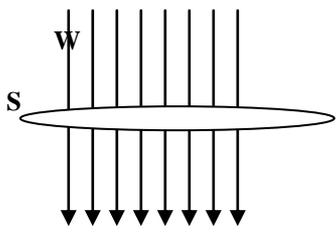


# 10. Электромагнитные колебания и волны.

| Явления, понятия, законы                                    | Графическая модель                                                                                                                                            | Математическая модель                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>1. Гармонические колебания.</b></p>                   | <p>колебательный контур →</p>  <p>~q, u, i, W<sub>L</sub>, W<sub>c</sub></p> | <p><math>q = q_m * \cos \omega t;</math><br/> <math>\omega = \frac{2\pi}{T};</math> <i>цикл. частота;</i><br/> <math>T = 2\pi \sqrt{LC}</math> – <i>период</i><br/> <math>\nu = \frac{1}{T};</math> <i>частота.</i><br/> <math>i = q' = \omega * q_m * \cos(\omega t + \frac{\pi}{2});</math><br/> <math>i' = q'' = -\omega^2 * q_m * \cos \omega t;</math><br/> <math>W = \frac{Cu^2}{2} + \frac{Li^2}{2} = const;</math></p> |
| <p><b>2. Переменный ток.</b></p>                            |                                                                             | <p><math>u = U_m \cos \omega t;</math><br/> <math>i = I_m \cos(\omega t + \varphi);</math><br/> <math>p = UI; \quad U = \frac{U_m}{\sqrt{2}};</math><br/> <math>I = \frac{I_m}{\sqrt{2}};</math></p>                                                                                                                                                                                                                           |
| <p><b>3. Активная нагрузка в цепи переменного тока.</b></p> |                                                                            | <p><math>u = U_m \cos \omega t;</math><br/> <math>i = I_m \cos \omega t</math><br/> <math>p = UI;</math><br/> <math>I = \frac{U}{R};</math></p>                                                                                                                                                                                           |
| <p><b>4. Индуктивность в цепи переменного тока.</b></p>     |                                                                            | <p><math>u = U_m \cos \omega t;</math><br/> <math>i = I_m \cos(\omega t - \frac{\pi}{2})</math><br/> <math>X_L = \omega L;</math></p>                                                                                                                                                                                                     |
| <p><b>5. Конденсатор в цепи переменного тока.</b></p>       |                                                                            | <p><math>u = U_m \cos \omega t;</math><br/> <math>i = I_m \cos(\omega t + \frac{\pi}{2})</math><br/> <math>X_c = \frac{1}{\omega C};</math></p>                                                                                                                                                                                           |

|                                                           |                                                                                     |                                                                                                                               |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <p><b>6.Цепь с R, X<sub>c</sub>, X<sub>L</sub></b></p>    |     | $Z = \sqrt{R^2 + (X_L - X_c)^2}$                                                                                              |
| <p><b>7.Резонанс в электрической цепи.</b></p>            |    | <p>При <math>X_L = X_c; \omega = \omega_0;</math><br/> <math>\omega = \frac{1}{\sqrt{LC}} = \omega_0;</math></p>              |
| <p><b>8.Электромагнитные волны</b></p>                    |   | $\lambda = c * T;$ $c = 300000 \frac{\text{км}}{\text{с}};$<br>$T = 2\pi\sqrt{LC} \text{ ; для к.контура}$                    |
| <p><b>9.Трансформатор.</b></p>                            |   | $\frac{U_1}{U_2} = \frac{n_1}{n_2} = k - \text{коэфф.тр-ции};$ $\frac{U_1}{U_2} = \frac{I_2}{I_1}; (\text{тр.под нагрузкой})$ |
| <p><b>10.Плотность потока электромагнитной волны.</b></p> |  | $I = \frac{W - \text{энергия}}{S * t}$                                                                                        |