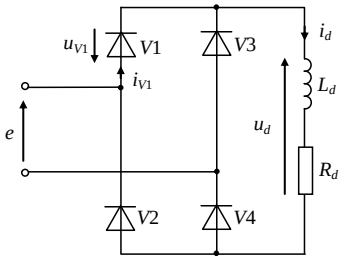
# Single-phase bridge rectifier with inductive load

$e = 326 \sin 100\pi t$, V

$L_d = 1\,\text{H}$

$R_d = 1\,\Omega$




## Analysis

$\omega = 100\pi\ \text{rad/s}$

$$f = \frac{\omega}{2\pi} \qquad \boxed{f = 50\ \text{Hz}}$$

$$T = \frac{1}{f} \qquad \boxed{T = 20\ \text{ms}}$$

$$\tau = \frac{L_d}{R_d} \qquad \boxed{\tau = 1\,\text{s}}$$

$$\tau \gg \frac{T}{2} \Longrightarrow i_d \approx \text{const.} = I_d(0)$$

$$U_d(0) = \frac{2}{\pi}\hat{E} \qquad \boxed{U_d(0) = 207{,}5\ \text{V}}$$

$$U_d(0) = U_{Ld}(0) + U_{Rd}(0) \qquad U_{Ld}(0) = 0 \qquad U_d(0) = U_{Rd}(0)$$

$$I_d(0) = \frac{U_d(0)}{R_d} \qquad \boxed{I_d(0) = 207{,}5\ \text{A}}$$

$$I_{V1}(0) = I_{V2}(0) = I_{V3}(0) = I_{V4}(0) = \frac{I_d(0)}{2} \qquad \boxed{I_{V1}(0) = 103{,}8\ \text{A}}$$

$$I_{V1} = I_{V2} = I_{V3} = I_{V4} = I_d(0)\frac{1}{\sqrt{2}} \qquad \boxed{I_{V1} = 146{,}8\ \text{A}}$$

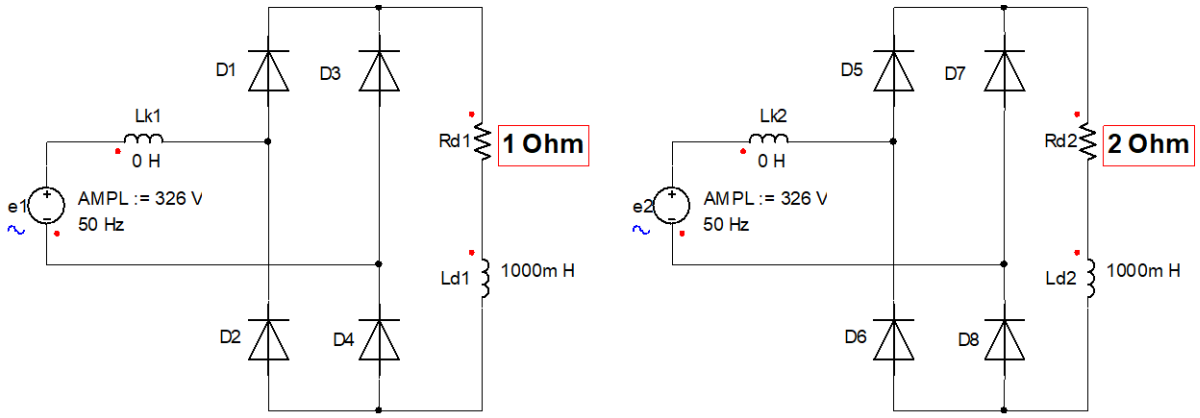
Waveforms obtained by changing of parameters $R_d$ and $L_d$ will be presented.

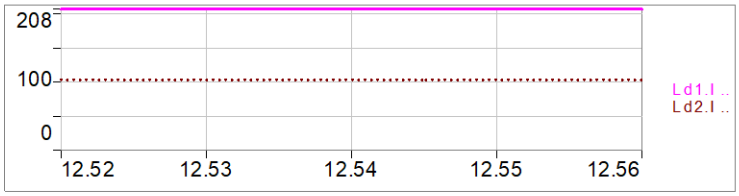
The waveforms are simulated in Simplorer 6.0.

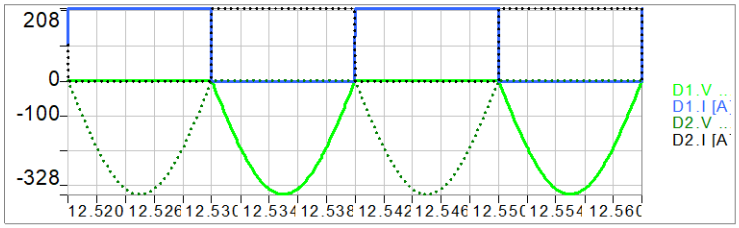


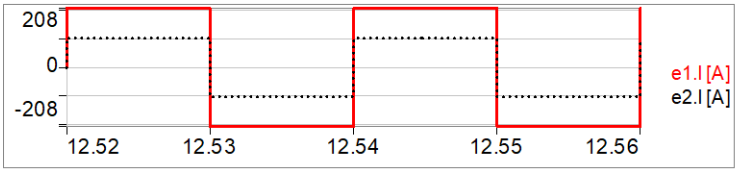
Željko Stojanović, 2014.

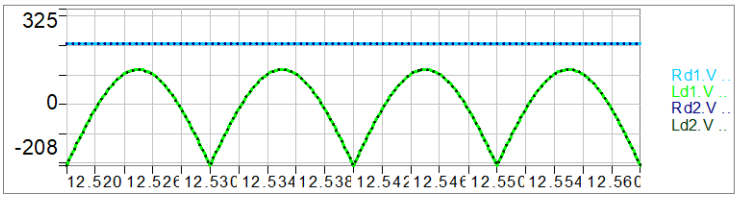
# Dependance of the rectifier waveforms on the load resistance $R_d$



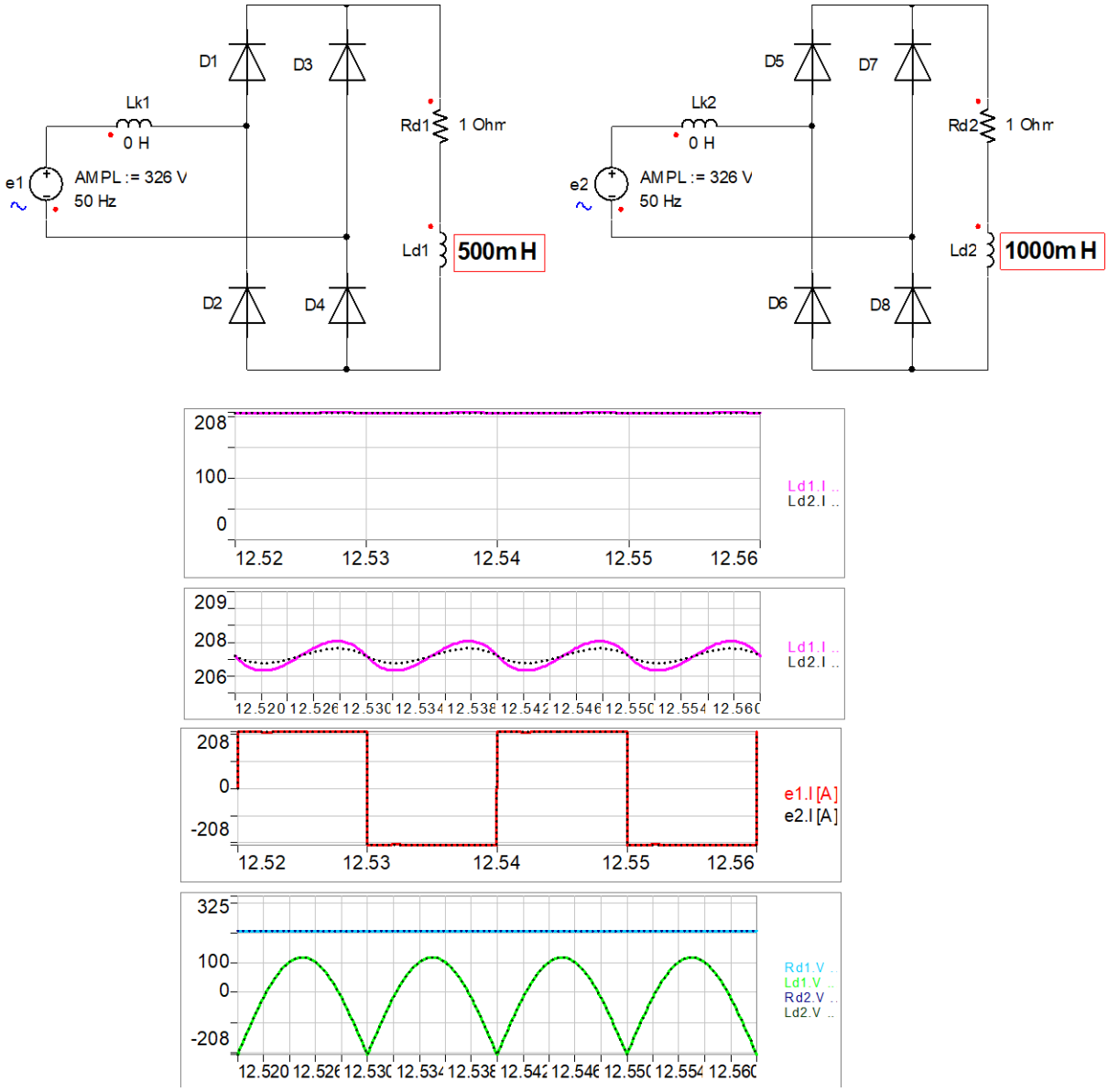



## Dependance of the rectifier waveforms on the load inductance $L_d$




Load inductance does not affect the average load current, but only its ripple.