Effect of rich air/fuel ratio and temperature on NO_x desorption of lean NO_x trap

富空气/燃料比和温度对于稀燃NO_x捕集器的NO_x脱附的影响

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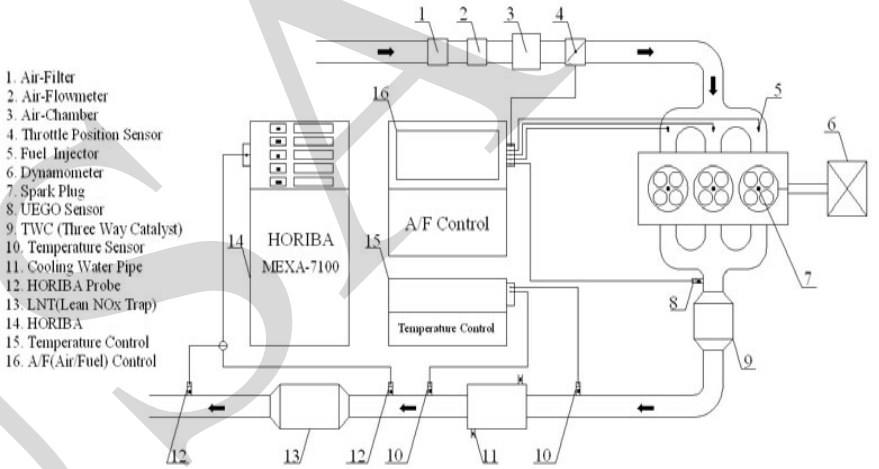
The main goal of this paper

An experimental and model-based study of the effect of rich air/fuel ratios (AFRs) and temperature on the NO_x slip of a LNT (Lean NO_x Trap) was conducted in a lean-burn gasoline engine with an LNT after-treatment system.

Layout of the lean-burn gasoline engine test bench with LNT



Working conditions of the lean-burn gasoline engine

Load (MPa)	0.3
Speed (r/min)	2800
Rich: Lean (s/s)	7: 56

Inlet gases conditions of the LNT (othes inlet gases were regarded as N_2)

AFR	Flow (g/s)	NOx (10^{-6})	CO (10^{-6})	O_2 (10^{-6})	CO_2 (10^{-6})	HC (10^{-6})
23 (Lean)	14.4	1199	14.05	68400	106000	58.90
10 (Rich)	12.1	22	35664	19945	110727	4232
11 (Rich)	12.1	23.6	32922	23672	110363	3911
12 (Rich)	12.1	30.4	30180	27400	110000	3590
13 (Rich)	12.1	40	27437	31127	109636	3268
14 (Rich)	12.1	56	24695	34854	109272	2947

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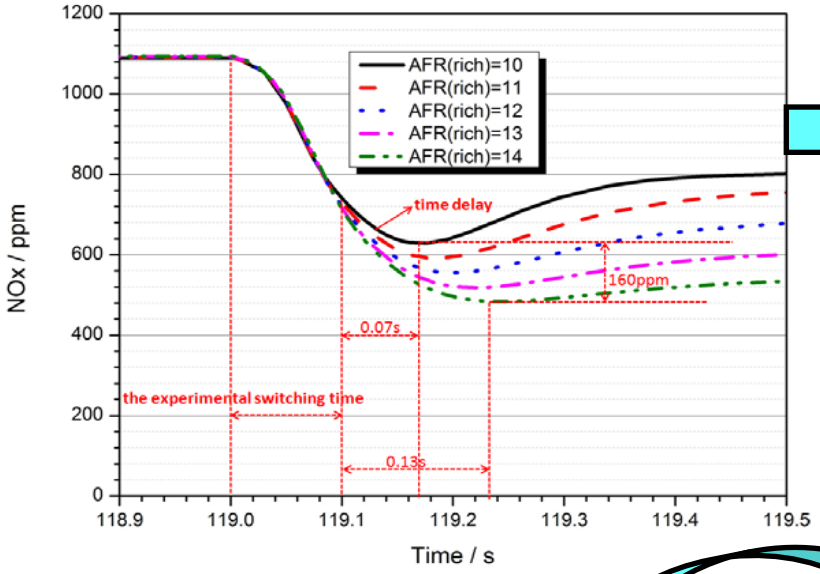
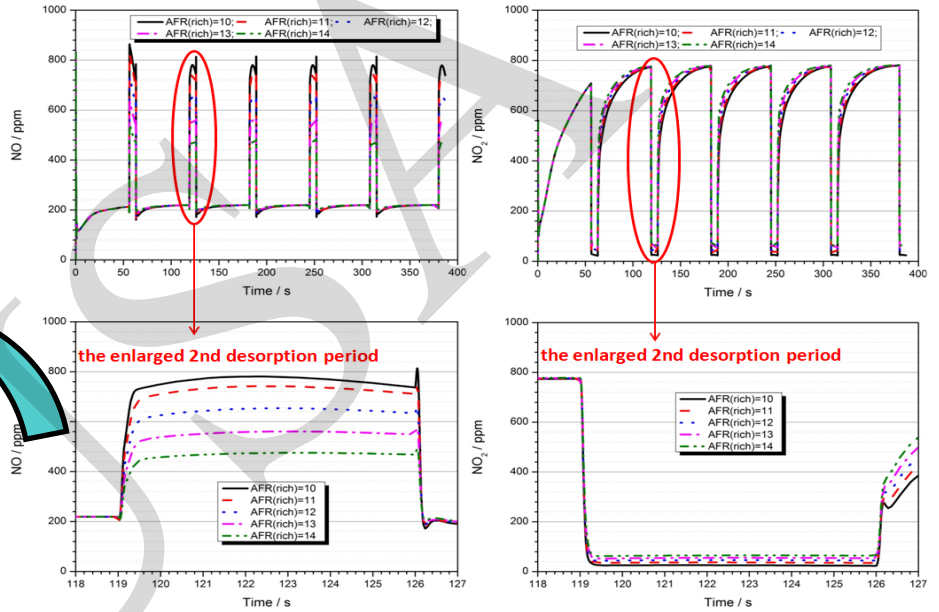
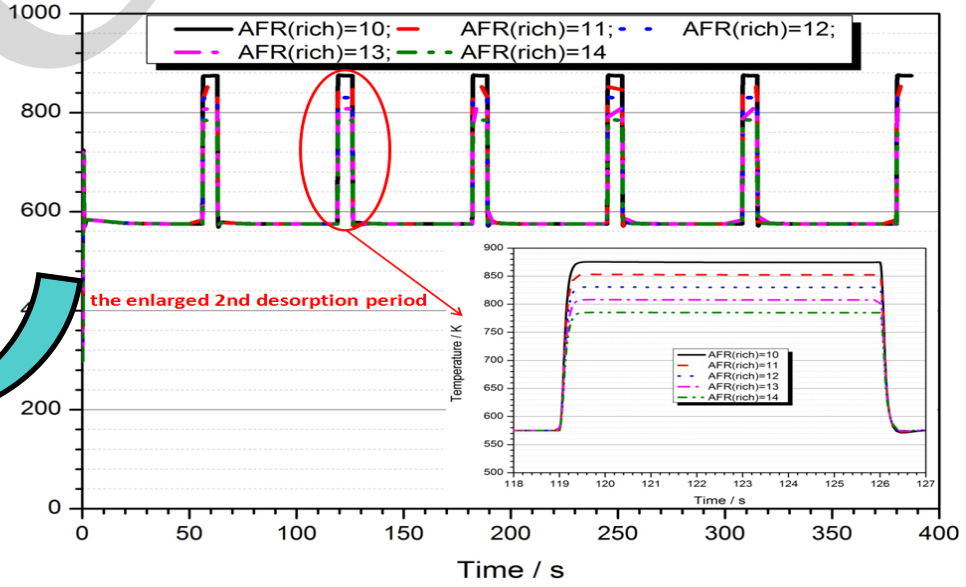
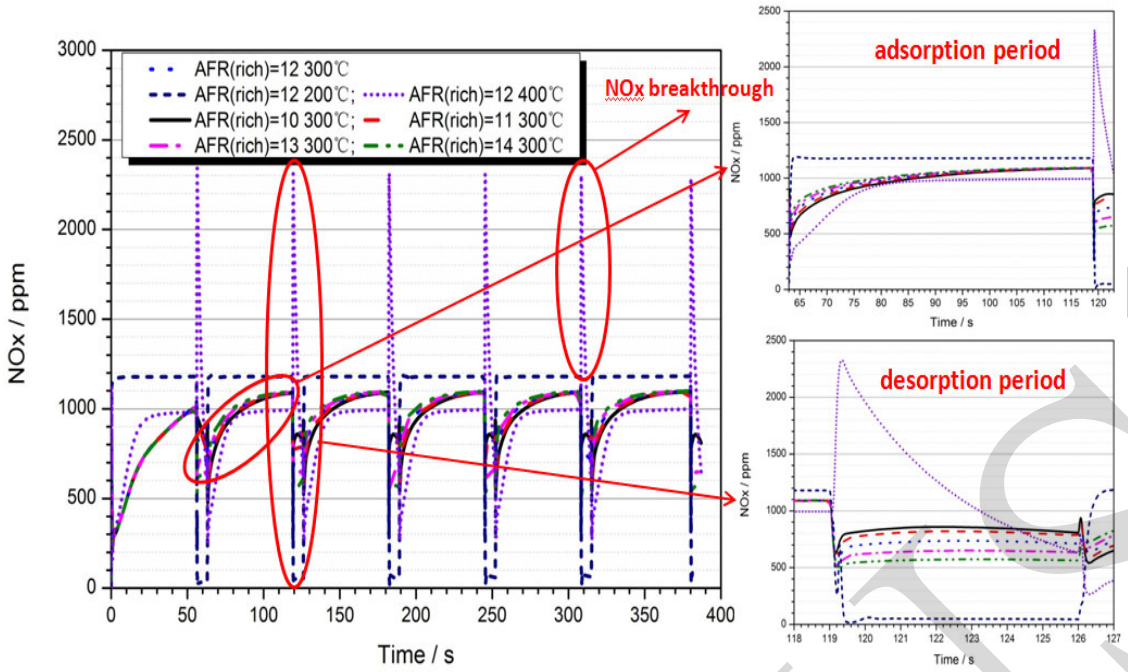


There was a time delay between the actual switching time and the experimental switching time. While that little time delay had a pronounced influence on NO_x slip.

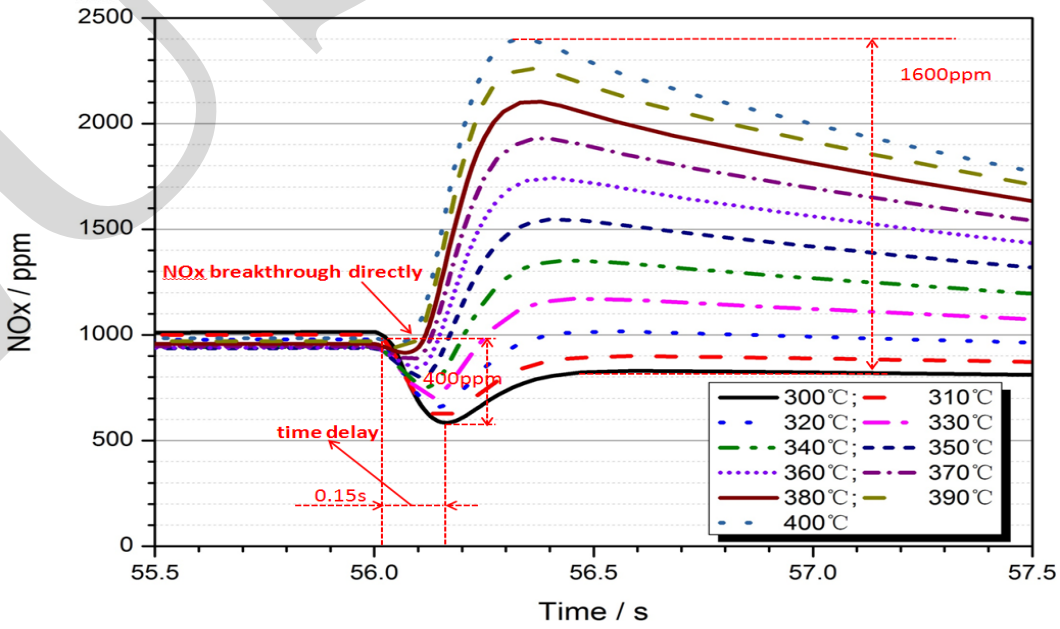


An increase in the rich AFR of the engine was beneficial for NO_x adsorption and desorption in the LNT, which is always characterized by O_2 and temperature.





The start point of NO_x desorption at a rich AFR of 12 with an inlet temperature of 400 ℃ was earlier than in other cases.



Temperature was the major factor in affecting NO_x breakthrough.

Conclusion: The strength of the desorption atmosphere created by a rich AFR can be compensated by adjusting the inlet temperature, without a penalty in consumption.

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