

## Flame Acceleration of Premixed Natural Gas/Air Explosion in Closed Pipe

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**Abstract :** An experimental study has been done to investigate the flame acceleration in a closed pipe. A horizontal steel pipe, 2m long and 0.1 m in diameter (L/D of 20), was used in this work. For tests with 90 degree bends, the bend had a radius of 0.1 m and thus, the pipe was lengthened 1 m (based on the centreline length of the segment). Ignition was affected one end of the vessel while the other end was closed. Only stoichiometric concentration ( $\Phi$ , = 1.0) of natural gas/air mixtures will be reported in this paper. It was demonstrated that bend pipe configuration gave three times higher in maximum over-pressure (5.5 bars) compared to straight pipe (2.0 bars). From the results, the highest flame speed of 63 m s<sup>-1</sup> was observed in a gas explosion with bent pipe, greater by a factor of ~3 as compared with straight pipe (23 m s<sup>-1</sup>). This occurs because bending acts similar to an obstacle, in which this mechanism can induce more turbulence, initiating combustion in an unburned pocket at the corner region and causing a high mass burning rate which increases the flame speed.

**Keywords :** bending, gas explosion, bending, flame acceleration, over-pressure

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