Supplementary Information

Soot growth by monodisperse particle dynamics model coupled with Computational Fluid Dynamics

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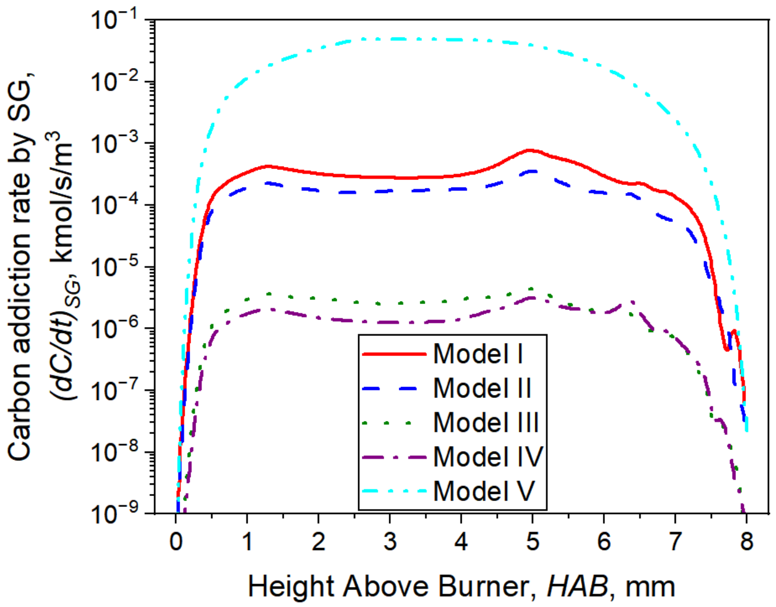

Figure S1: Variation of carbon addition rate due to surface growth, $\left(\frac{dC}{dt}\right)^{SG}$, as a function of height above the burner (HAB) for Models I–V at burner-to-stagnation plate separation (H_p) of 8 mm.

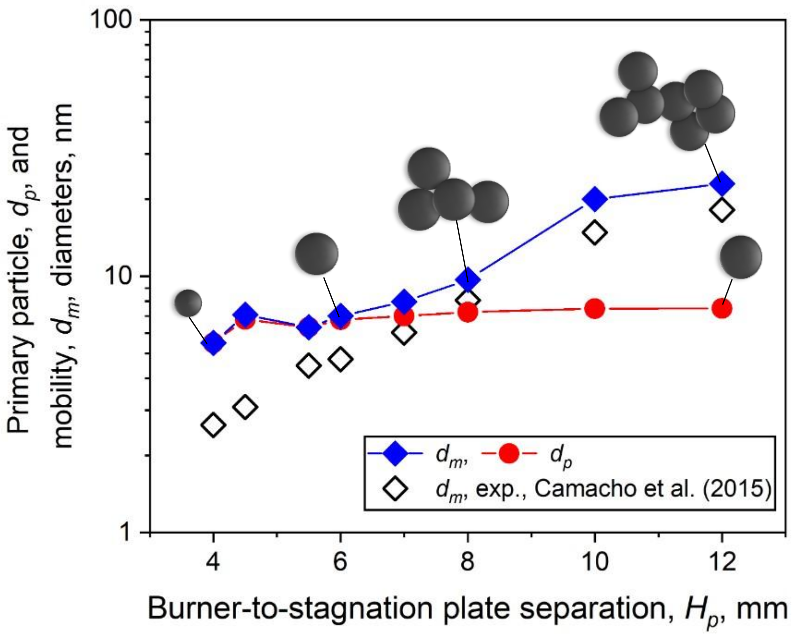

Figure S2: Soot primary particle diameter, d_p (circles), and mobility diameter, d_m (filled diamonds) obtained by Model II as a function of H_p. The results are compared to the number-based average d_m obtained by scanning mobility particle sizer measurements in premixed ethylene flames (Camacho et al., 2015). Up to $H_p \approx 6$ mm, the PD-CFD-derived d_p and d_m are practically identical, indicating that particles remain nearly spherical. At $H_p >$ 6 mm, d_m increases while d_p remains nearly constant, reflecting the transition from spherical particles to fractal-like agglomerates.

References

Camacho, J., Liu, C., Gu, C., Lin, H., Huang, Z., Tang, Q., You, X., Saggese, C., Li, Y., Jung, H., Deng, L., Wlokas, I., and Wang, H.: Mobility size and mass of nascent soot particles in a benchmark premixed ethylene flame, Combustion and Flame, 162, 3810–3822, https://doi.org/10.1016/j.combustflame.2015.07.018, 2015.