Theorem: Suppose we choose

$\boxed{\mathbb{P}_k := \mathbb{P}^2(C_k)}$ in Step 3 of SSDP and in Step 3′ of SSILP Relaxation Methods.

Then

(a) $\mathrm{conv}(F) \subseteq C_{k+1} \subseteq C_k, \quad \forall\, k \geq 0;$

(b) $\bigcap_{k=0}^{k^*} C_k = \emptyset$, if $F = \emptyset$;

(c) $\bigcap_{k=0}^{\infty} C_k = \mathrm{conv}(F)$, if $F \neq \emptyset$.

We have the same conclusion (a), (b), (c) if we choose $\boxed{\mathbb{P}_k := \mathbb{P}^S(C_k)}$ instead.

Kojima, T. (SIAM J. Opt. [2000])