Reply to comment by S. Nadarajah on "Space-time modeling of soil moisture: Stochastic rainfall forcing with heterogeneous vegetation"

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[1] The comment by *Nadarajah* [2007] focuses on the spatial correlation function of the rainfall forcing adopted in the theoretical analysis of the soil water balance addressed by *Isham et al.* [2005] and *Rodríguez-Iturbe et al.* [2006]. In this expression, we simplified the area of overlap $C(u)$ of two unit discs (representing the rain cells) with centers distance u apart by adopting a linear approximation

$$C_k(u) = \begin{cases} \pi - ku & 0 \le u \le 2 \\ 0 & 2 \le u, \end{cases} \quad (1)$$

where k is a constant assumed equal to $\pi/2$. As shown in Figure 1, this approximation is quite satisfactory. There is only a slight overestimation in the correlation function of the rainfall intensity, as discussed in section 2 of *Isham et al.* [2005], where the approximated correlation function was compared with the exact solution of the correlation function obtained via numerical integration.

[2] The great advantage of this hypothesis is that it makes the model analytically solvable, providing a simple form for the correlation function of the rainfall field in which dependence on physically meaningful parameters is clearly defined. Nevertheless, the use of the solution proposed by *Nadarajah* [2007], based on the Bessel and Struve functions, may be useful in further applications of the quoted model.

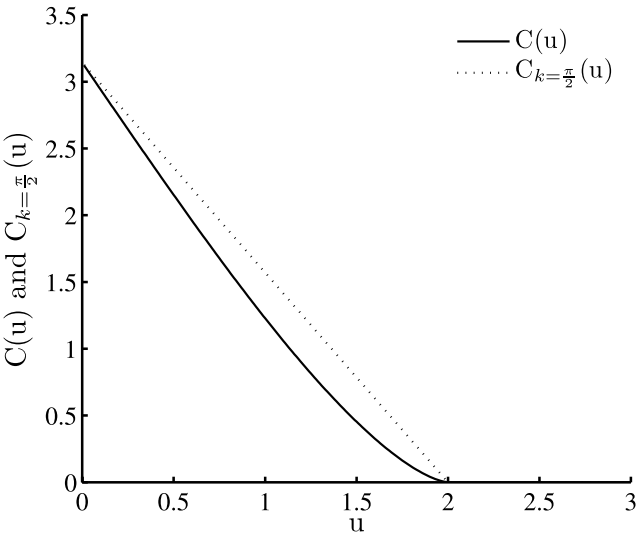

Figure 1. Comparison between the area of overlap of two unit discs $C(u)$ and its approximation $C_k(u)$.

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