

# 1 Some New Results on Conflict-Free Colouring

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## 4 — Abstract —

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5 We present a polynomial time reduction from the conflict-free colouring problem in hypergraphs  
6 to the maximum independent set problem in simple graphs. Specifically, we show that the  
7 conflict-free colouring number of a hypergraph with  $m$  hyperedges is  $k$  if and only if the simple  
8 graph output by the reduction, denoted by  $G_k$ , has a maximum independent set of size  $m$ . We  
9 show that the simple graph resulting from this reduction applied to an interval hypergraph with  
10 three disjoint intervals is a perfect graph. Based on this, we obtain a polynomial time algorithm  
11 to compute a minimum conflict-free colouring of interval hypergraphs, thus solving an open  
12 problem due to Cheilaris et al.[1]. We also present another characterization of the conflict-free  
13 colouring number in terms of the chromatic number of graphs in an associated family of simple  
14 graphs. We use this characterization to prove that for an interval hypergraph the conflict-free  
15 colouring number is the minimum partition of its intervals into sets such that each set has an  
16 exact hitting set (a hitting set in which each interval is hit exactly once).

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**Lines** 16

## 17 — References —

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- 18 **1** Panagiotis Cheilaris, Luisa Gargano, Adele A. Rescigno, and Shakhar Smorodinsky. Strong  
19 conflict-free coloring for intervals. *Algorithmica*, 70(4):732–749, December 2014.



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