

Abstract Submitted  
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**Linked and Knotted Gravitational Radiation** AMY THOMPSON,  
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UC Santa Barbara — It is well known that in electromagnetism there exist solutions  
with linked and knotted field lines. In particular, the electromagnetic hopfion is  
a null solution such that any two field lines corresponding to either the electric,  
magnetic, or Poynting vector fields are closed and linked exactly once. Previously  
we showed that using twistor methods one can construct the electromagnetic hopfion  
and the analogous linearized gravitational field. In the case of gravity the topological  
structure manifests in the tendex and vortex lines, the analog of the electromagnetic  
field lines, so that each set of integral curves also has linking number one. We now  
show that these solutions are the simplest case in a class of topologically non-trivial  
solutions. Reparameterizing the twistor elementary states in terms of the winding  
numbers of the field lines allows one to choose the degree of linking or knotting of  
the associated field configuration. We will discuss the properties of these solutions  
and the effect of the topology on the time evolution of the gravitational fields.

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