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*Fractal tube formulas for relative fractal drums in arbitrary Euclidean spaces via Lapidus zeta functions.*

Relative fractal drums generalize the notion of fractal sets in Euclidean spaces of arbitrary dimension. We establish pointwise and distributional fractal tube formulas for a large class of relative fractal drums. These fractal tube formulas are expressed as sums of residues of suitable meromorphic functions over the complex dimensions of the relative fractal drum under consideration (i.e., over the poles of its distance or tube zeta function which generalizes the well-known zeta function for fractal strings). These results generalize to higher dimensions the corresponding ones previously obtained for fractal strings by M. L. Lapidus and M. van Frankenhuysen. We illustrate our results by several interesting examples and apply them to obtain a new Minkowski measurability criterion. We also reflect on the notion of  $h$ -Minkowski measurability (where  $h$  is an appropriate gauge function), which is connected to the existence of principal complex dimensions of higher order (i.e., multiplicity). (Received September 18, 2015)