Fourier Series for the Fundamental Solution of the Bi-Laplace Equation in  $\mathbb{R}^3$ 

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In this talk I will introduce by describing how one obtains free-space Green's function expansions for the Laplace and Bi-Laplace equations in  $\mathbb{R}^3$ . I will then show how these Fourier expansions are given in terms of toroidal harmonics, i.e. half-integer degree associated Legendre functions of the second kind. Toroidal Fourier expansions might be obtained in all the rotationally invariant coordinate systems which allow separation of variables for a homogeneous 3-variable partial differential equation which admits a free-space Green's function. In this regard, I will focus and present explicit formulae as applied to the free-space Green's function for the 3-variable Laplace equation and for the 3-variable bi-Laplace equation.